

RELATIONSHIPS BETWEEN SUPPORTIVE PHYSICAL HOME ENVIRONMENT AND PARTICIPATION IN LIFE ACTIVITIES AMONGST COMMUNITY-LIVING, OLDER AUSTRALIANS

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STATEMENT OF AUTHENTICATION

I certify that this submission is my own work except where cited in text as being adopted from other sources.

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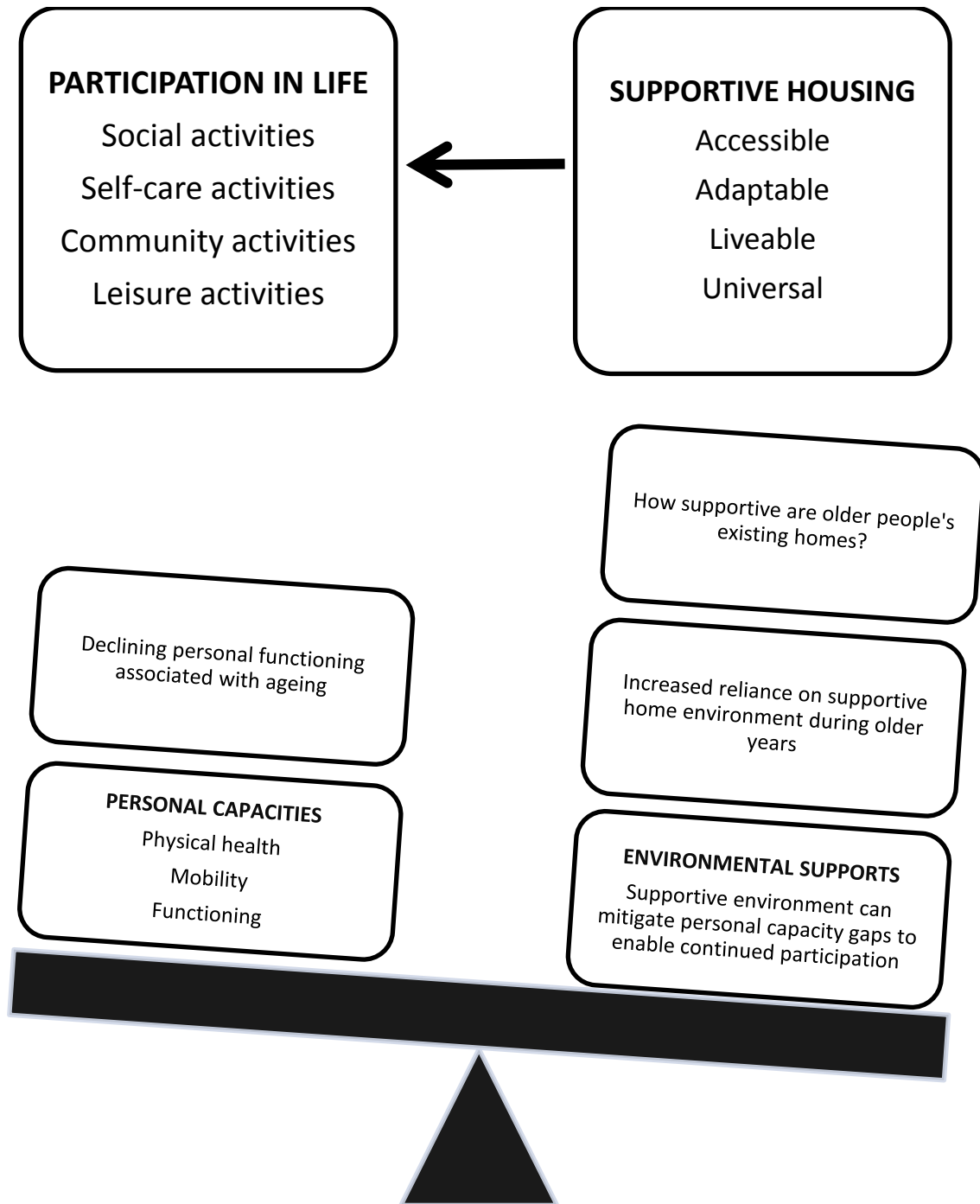
SECTION 1: REVIEW OF THE LITERATURE

1. Search strategy

The literature search for this study included relevant journals, databases and websites. Databases that were searched included Ageline, Medline, Cinahl, Web of Science, Cochrane and OT Seeker. Journals that were searched included Australian Occupational Therapy Journal, American Journal of Occupational Therapy, Australasian Journal of Ageing and Journal of Housing for the Elderly. Websites searched included Australian Government Department of Health and Ageing and World Health Organisation. Search terms included: aged, elderly, older adults, frail, older people, older persons, geriatric, community dwelling or community living or resides/residing at home or lives/living at home or independent living, accessible housing, adaptable housing, supportive housing, housing, housing design, home modification or home structural modification or home improvement/s or flexible housing, participation, social participation, activities of daily living, occupation, healthy ageing, ageing in place.

2. Outline of underlying concepts within the study

Figure 1: Underlying concepts within the study



3. Abstract

Australia has an ageing population. How we house and care for this rapidly expanding group is an issue that will likely have implications for individuals in terms of quality of life. It is also increasingly becoming an issue with strong implications for society and government (Karol, 2008). The ageing population is expected to create greater aged care demands, with economic and policy implications (Giles, Cameron, & Crotty, 2003). Having an understanding of the factors that are important in accommodating older people and supporting their quality of life will be important in guiding policy decisions as well as informing individual's decisions (Kalfoss & Halvorsrud, 2009). Important factors in quality of life for older people include the home environment and ability to participate in meaningful activities of life (Gabriel & Bowling, 2004). Research demonstrates associations between better quality physical home environments and better participation in activities (Oswald et al, 2007). However it is unclear what associations exist between the supportiveness of the home built environment as rated by independent assessors and the level of participation of older residents in a broad range of life activities.

4. Introduction - Australia's ageing population

Australians are living longer than ever. Over the past 100 years, there have been advances in sewage systems, food and water supplies, health education, technology, and medical care (Australian Bureau of Statistics [ABS], 2011). This has increased the number of people surviving to retirement age and lengthened the period of time people survive after retirement (Hugo, 2013). An Australian celebrating their 65th birthday in 1969 could expect to live a further 15 years, this has now increased to 21 years (ABS, 2011). Additionally, the post-war spike in fertility rates in Australia, which shifted the nation's demography towards youth at that time, is now contributing to the ageing of the population as this group reaches retirement age (Hugo, 2013).

The proportion of older people across the world is predicted to increase from around 6% in year 2000, to 19% in 2050 (Low, Yap, & Brodaty, 2011). In Australia, the proportion of older people increased from 4% in 1901, to 13.5% in 2010, and is expected to increase to 21% by 2041 (ABS, 2011). This population shift towards old-age presents major economic and social implications for Governments to consider (ABS, 2011; Hugo, 2013). Functional capacity tends to decline with age, therefore, Governments are considering how they will meet increased demands for disability services, health services, housing and aged care (ABS, 2011).

4.1. Implications of the ageing population

Older people's performance of various activities of daily living (ADLs) is often impacted by declining capacities, resulting in increased demand for services (Braubach & Power, 2011). Age-related functional loss is a frequent cause of institutionalisation and care needs (Gitlin, Winter, Dennis, & Corcoran, 2006). Aged people often experience difficulties due to sensory perception impairments, cognitive decline and reduced strength, endurance and balance (Auriemma, Faust, Sibrian & Jimenez, 1999). It is estimated that 80% of aged people have a chronic health condition (Auriemma et al, 1999). Older Australians commonly experience participation limitations in physical activities and in work, most often resulting from musculoskeletal conditions (particularly arthritis and back pain) (Australian Bureau of

Statistics [ABS], 2006). As shown in Table 1, there are also a number of other health conditions affecting older people (Giles et al., 2003).

Health Condition and Activity Limitation:	Age in years:		
	0-64	75-84	85+
Musculoskeletal			
Profound activity limitation	1.46%	8.22%	19.93%
Mod/Mild activity limitation	3.08%	11.99%	8.87%
Nervous system			
Profound activity limitation	0.56%	4.64%	15.87%
Mod/Mild activity limitation	0.51%	0.31%	0.04%
Circulatory			
Profound activity limitation	0.11%	2.62%	6.69%
Mod/Mild activity limitation	0.36%	3.65%	2.07%
Stroke			
Profound activity limitation	0.06%	2.03%	5.44%
Mod/Mild activity limitation	0.04%	0.64%	0.46%
Vision			
Profound activity limitation	0.04%	1.44%	3.50%
Mod/Mild activity limitation	0.07%	1.95%	0.80%
Respiratory			
Profound activity limitation	0.24%	1.31%	2.39%
Mod/Mild activity limitation	0.53%	2.69%	0.56%
Psychiatric			
Profound activity limitation	0.31%	0.91%	1.58%
Mod/Mild activity limitation	0.47%	0.38%	0.03%
Cancer			
Profound activity limitation	0.08%	0.33%	0.80%
Mod/Mild activity limitation	0.09%	0.64%	0.41%
Hearing			
Profound activity limitation	0.07%	0.20%	1.93%
Mod/Mild activity limitation	0.35%	4.39%	3.09%

Table 1. Prevalence of Australian's Health Conditions Related to Activity Limitation in 1998 (adapted from Giles et al., 2003 p.132)

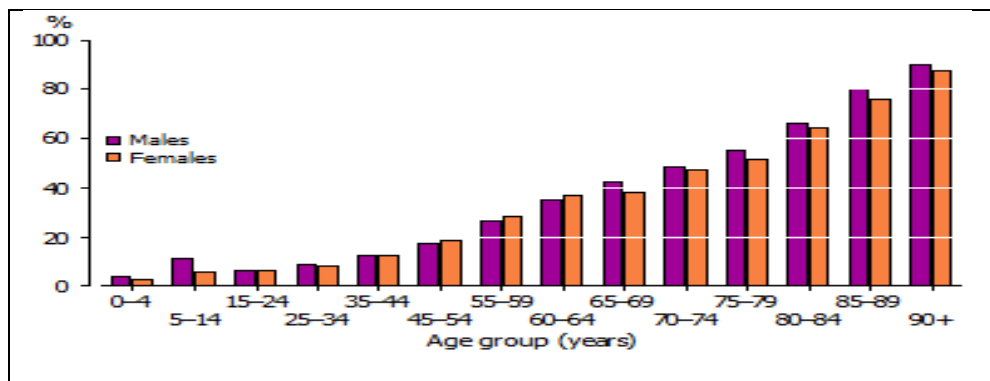


Figure 2. Australian Bureau of Statistics Graph - Disability Rates by Age Group in 2009 (ABS, 2011)

The likelihood of developing activity restrictions increases with age (ABS, 2011). As shown in Figure 2, disability was reported by around 40% of people aged 65-69 years and 88% for those aged greater than 90 years in Australia, in the year 2009 (ABS, 2011). Based on these age-related rates of activity restrictions and based on the ageing population, Australia is predicted to have a significantly higher concentration of people with activity restrictions in the future (ABS, 2011). Using an analysis of ABS data, Giles et al (2003) predicted that there will be twice as many people experiencing restriction due to vision, stroke and impairments of musculoskeletal, nervous, circulatory and respiratory systems in 2031 as there were in 2006.

However, the effects that ageing will have on levels of activity restrictions in the population are not entirely clear. Forecasts of a vastly increased disability burden rely on the assumption that age-group rates of disability remain unchanged (Lutz & Scherbov, 2005). Some researchers contend that the increase in population activity restriction levels will not be as pronounced as predicted because there is evidence that activity restriction rates in older people have declined over the past twenty years (Crimmins, Hayward, Hagedorn, Saito, & Brouard, 2009). As such, perhaps the same factors that contribute to increased life-expectancy are also contributing to increased functionality in late life?

Crews & Zavotka (2006), assert that the usual age-related disabilities of the 20th century are now being delayed until later old-age in the 21st century. They view this as being similar to the pattern seen during the 20th century, when 19th century age-related disabilities were

delayed to older ages. There is cross-sectional evidence from various countries suggesting that disability-free or disability-reduced life expectancy is rising (Crimmins et al, 2009). Cross sectional data cannot explore changes across time, however, in one study, Crimmins et al (2009) used longitudinal data to investigate disability-free life expectancy. They found that a group of community-dwelling people who were 70 years old in 1994 had a longer period of disability-free life than a comparison group who were 70 years old in 1984 (Crimmins et al, 2009). However, this study was based in the United States and may not necessarily be generalisable to Australia. The effects on populations of delayed commencement of disability may be significant. Mathematical modeling has demonstrated that a delay of 3 years in the average age of disability commencement would result in 30 million less disabled people in Europe in the year 2050 than is currently forecast (Lutz & Scherbov, 2005).

Under the International Classification of Functioning, Disability and Health framework, the degeneration of the body that occurs with ageing is only one factor contributing to functional outcomes (World Health Organisation [WHO], 2002). Various factors contribute to functional ability and an impairment in one factor, such as capacity, may be mitigated by a different factor, such as environment (Iwarsson, Isacson & Lanke, 1998; Liu & Lapane, 2009). People with reduced capacities may still be able to participate in their roles within particular environments (Crimmins et al, 2009). It is expected that the oldest old will have greater vulnerability to environmental effects due to greater personal capacity impairments (Oswald, et al., 2007). The ability of aged people to maintain independence is partially related to how well the built environment accommodates their needs as their personal functioning declines (Crews & Zavotka, 2006). Therefore, levels of participation in the ageing population are likely to depend on a combination of people's health, frailty and how well environments mitigate any functional declines (Crews & Zavotka, 2006).

4.2. International Classification of Functioning, Disability and Health (ICF) – A Theoretical Framework Guiding This study

The ICF is a useful framework to guide this study because it equates health and well-being with the ability to participate in life (WHO, 2002). The ICF is an internationally recognised

framework (endorsed by the World Health Assembly in 2001) for describing the health of individuals and populations. It is based on a biopsychosocial perspective, in which medical and social views of disability are integrated (WHO, 2002). A medical view describes disability in terms of variation from expected medical function, whilst a social view describes disability in terms of restricted access to participate in life (Raghavendra, Bornman, Granlund, & Bjorck-Akesson, 2007). The ICF views a person as experiencing disability when they are experiencing activity restrictions in participation. As shown in figure 3, these limitations are considered to be the products of interactions between health and contextual factors. Contextual factors include the natural, built, social and legal environments and personal characteristics including age, gender and education (WHO, 2002). Therefore, health is seen as more than just an absence of physical disease and instead incorporates environmental factors, personal factors and the ability to participate in life, in addition to bodily factors (WHO, 2002).

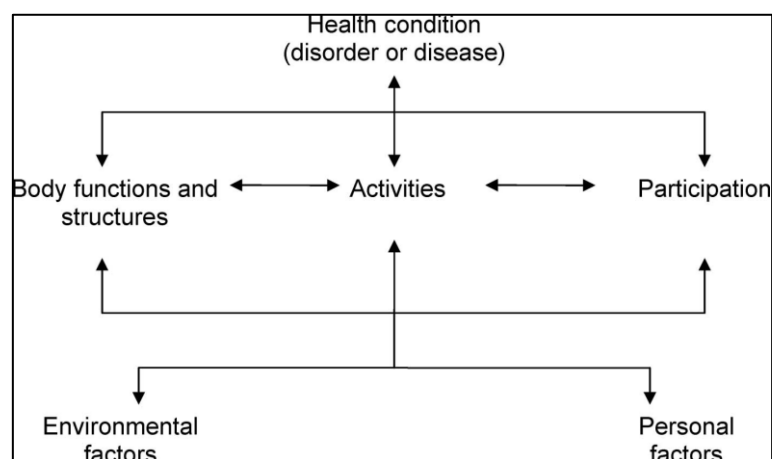


Figure 3. ICF Model (WHO, 2002 p9).

Applying the ICF enables identification of environmental barriers and facilitators for participation and consideration of interventions aimed at either personal capacity-improvement or environmental modification as appropriate (WHO, 2002).

5. Where will Australia's older people live?

Providing appropriate housing and care for the ageing population is a major policy challenge (Karol, 2008). Over recent decades, Governments in various countries have broadened their focus from care of a frail, elderly population to include consideration of how best to accommodate independent older people (Leeson, 2006). Based on costs and on older people's preferences, home and community care has become the emphasis worldwide (Low et al, 2011). Community care often includes services such as home nursing, cleaning, shopping, transport, social outings and allied health (Low et al, 2011). In some countries, Governments may assist with the costs of home maintenance, home modification or may provide suitable housing near-by so that people may remain connected to their community (Howden-Chapman, Signal & Crane, 1999; Smith, Rayer & Smith, 2008). Suggestions for future policy considerations have included a greater emphasis on universal design for new home building (Smith et al, 2008).

In Australia, the Federal Government released an aged care reform package in 2012, which aimed to improve aged care and provide people with choice over services (Australian Government Department of Health and Ageing, 2012). This program prioritised supports for older people to stay at home (Australian Government Department of Health and Ageing, 2012). Strategies to support people to remain living in the community included assisting people to obtain domestic and personal care at home, home nursing and allied health services, social support, home maintenance and modifications, meal delivery and carer respite (Australian Government Department of Health and Ageing, 2012).

The NSW Government's current ageing strategy includes providing grants to local councils to assist in making towns more accessible, providing planning incentives to encourage affordable rental housing, supporting community programs that address older people's housing issues and encouraging the building industry to make use of the Australian Liveable Housing Design Guidelines (New South Wales Government, Department of Family & Community Services, 2013). This guideline provides for home building features that make

homes easier to use and to adapt to people's changing needs (Liveable Housing Australia, 2013).

5.1. Current Housing Options

The majority of older Australians live independently in the community (Stimson & McCrea, 2004). However, the older-old (considered to be 85yrs and older) are more likely than the younger-old to have moved home in search of support (Stimson & McCrea, 2004). Options for older people include living in their current home, a downsized home, a low-care supported environment such as a hostel or retirement village, or higher-care nursing home (Chin & Quine, 2012; Stimson & McCrea, 2004).

Only a minority of older Australians live in low-care facilities such as retirement villages (Stimson & McCrea, 2004). People move to villages seeking services, support, social network and safety (Stimson & McCrea, 2004). The supports provided by retirement villages may enable older people to live relatively independently for longer than in the community without support (Gardner, Browning & Kendig, 2005). However, this option remains relatively unpopular in Australia, with older people reporting concerns about fees and having their funds 'tied-up' after death (Gardner et al, 2005; Stimson & McCrea, 2004). Additionally, people often feel disempowered during negotiation with providers (Warnock, & Fisher, 2007).

Nursing-homes are generally used by people who are dependant in multiple activities of daily living (ADLs) (Nogueira, Reis, Atalaia, Raposo, & Serrasqueiro, 2011). Many older people report a strong aversion to moving into a nursing home (Chin & Quine, 2012). Concerns that people express include the anticipated loss of independence, control, privacy and friendships (Chin & Quine, 2012). Based on studies of nursing-home residents, these concerns do not seem to be entirely without foundation (Chin & Quine, 2012). Nursing home residents who are experiencing depression commonly describe the causes of their depression as relating to a lack of meaningful activities, lack of autonomy, lost continuity with past life, loneliness, limited privacy and living amongst cognitively impaired people and frequent deaths (Choi, Ransom, & Wyllie, 2008). Nursing home residents report across

various studies that they have limited autonomy regarding their daily activities, decision making and creative pursuits (Crist, 1999). Overseas research comparing reported levels of quality of life by residents in standard homes, homes specialised for their needs and nursing homes has found that people in specialised, adapted homes had the greatest level of quality of life and those in nursing homes had the lowest (Crist, 1999).

5.2. Older people's preferences

Older people frequently nominate choice of housing as an important factor in their quality of life (Crist, 1999). Factors that precipitate a decision to move from home vary greatly between older people, however some common considerations include social isolation, health concerns, need for assistance, mobility, finances, death of a spouse, safety, the cost of home maintenance, and seeking an enjoyable retirement location (Howden-Chapman et al, 1999; Stimson & McCrea, 2004). Health is often an important factor in the decision to move to a retirement community (Weeks, Keefe & Macdonald, 2012). Poor health may push people towards relocation in search of greater support, however good health may pull people towards relocation in search of better lifestyle amenities (Weeks et al, 2012).

People need their home to meet their physical, emotional and spiritual requirements (Warnock & Fisher, 2007). Therefore, lifestyle, history, connections and neighbourhood facilities are important factors in selecting the best housing option (Warnock & Fisher, 2007). Most older people, regardless of reduced personal functioning, express a desire to remain in their current home (Witso, Eide & Vik, 2012). The meaning of home to older people is impacted by having lived there for a long time and feeling an attachment (Oswald, et al., 2007). For many older people, the prospect of moving from their home represents a loss of their history, the place where they experienced important life events (Warnock & Fisher, 2007). Staying in their home gives them continuity with their history, community connections, a familiar environment and proximity to their customary activities (Safran-Norton, 2010; Warnock & Fisher, 2007).

Many older people do not need care and are capable of living independently in the community if they receive support services and if their home can be adapted as their needs

change (Warnock & Fisher, 2007). Therefore, older people overwhelmingly report a preference to remain at home and 'age in place' (Wiles, Leibing, Guberman, Reeve, 2012).

5.3. Ageing in place

The term 'ageing in place' refers to living in one's own home or community rather than entering residential care (Wiles et al., 2012). The definition of this term is somewhat heterogeneous in the literature. Many articles define ageing in place as staying in the family home, or another community based home (Hwang, Cummings, Sixsmith, & Sixsmith, 2011; Tang & Pickard, 2008). Others expand the definition to include assisted living, due to the relative independence that people still enjoy (Cho, Cook & Bruin, 2012). When asked to explain what 'age in place' means to them, older people often speak of social and community factors, sometimes referring to remaining in the same "area" rather than the same house (Wiles et al., 2012). Overall, the chief dimensions of the term appear to be community-living and relative independence. For the purposes of this review, we will define ageing in place as people aged over 65 years and living in the community rather than in residential care or specialised retirement facility.

When people are ageing-in-place, delivery of care services are based in the home. Whilst services are provided from agencies, much of the assistance is provided by family members (generally spouse or daughter) (Golant, 2008). For some researchers, this represents a flaw in using age-in-place to meet the needs of our ageing population. Golant (2008), argues that many older people receive inadequate care because their family care-givers are untrained, busy and tired from other responsibilities such as raising children and working, or elderly and infirm themselves. This is particularly a concern relating to heavy care assistance, such as bathing, medication management and behaviour monitoring (Golant, 2008).

Nevertheless, ageing-in-place is the preference of most older people, and also a government policy focus (Wang, Shepley & Rodiek, 2012). Ageing in place reduces the cost of caring for an ageing population (Wang et al., 2012). However, the existing housing stock may not be well designed to support ageing-in-place (Pynoos, 2001). Older people need flexible

housing that adapts as their personal functioning declines (Byles, Mackenzie, Redman, Parkinson, Leigh & Curryer, 2012).

5.4. Supportive housing

Various approaches are used to define homes that are more user-friendly. Common terms include accessible (homes that have been adapted for easy use), visitable (homes with features for ease of and movement into and through the home and easy access to a toilet), adaptable (homes with flexible features that can accommodate to people's changing needs), universal (homes designed to enable all people to use them rather than thinking in terms of standard versus accessible) and liveable (easy to enter, to move around within and to adapt as needed) (Campbell & Memken, 2007, Liveable Housing Australia, 2013). In this review, we use the term supportive housing to describe housing features that fall into any of these categories.

It has been estimated that in 2050, 21% of homes will house a person with a physical limitation, including 7% with a limitation in self-care (Smith et al, 2008). Older people need housing that is flexible to adapt to their changing personal capacities (Byles et al, 2012). Housing that is adapted to meet the needs of older people can improve their ability to engage in daily activities, be independent, avoid accidents, give or receive care and delay institutionalisation (Pynoos, 2001). When there is a poor fit between an older person's home environment and their personal functioning, there is an increased likelihood that they will be considering a move from their home (Erickson, Krout, Ewen & Robison, 2006). Cross sectional studies have found that poor housing accessibility is associated with ADL difficulties and that home modification and housing type is associated with positive ageing-in-place outcomes (Hwang et al, 2011; Iwarsson et al, 1998). Cross-sectional studies only represent a snapshot in time, however, there is longitudinal research demonstrating that home modifications can decrease the risk of personal function decline (Liu & Lapane, 2009).

Older people live in a wide variety of housing, however, there are common factors that represent home hazards (Howden-Chapman et al, 1999). Adaptable housing has elements that make the home more readily adjusted for individual needs (Campbell & Memken,

2007). This is a move away from providing special accommodation for people with different abilities (Standards Australia, 1995). Some adaptable elements address accessible routes into and through the home, workspace dimensions and accessible facilities (such as light switches) (Standards Australia, 1995).

Supportive home features can help mitigate people's diminishing functioning and reduce the likelihood that they will withdraw from activities and, therefore, are supportive of ageing in place (Campbell & Memken, 2007). However, there may be a specific period of time when a supportive home is beneficial for older people. Older people's perception of needing home modifications increases as their levels of instrumental activities of daily living and activities of daily living (I/ADL) functioning declines, but only during the early and middle stages of their functional decline. Once their I/ADL functioning becomes very limited, their perceptions of needing home modifications stops increasing (Stineman, Xie, Pan, Kurichi, Saliba, & Streim, 2011). This likely represents a point where the person is too functionally dependent for an adaptable home environment to mitigate their reduced functioning (Stineman et al, 2011).

Whilst older people often need environmental mitigants to their declining capacities, it appears that the current housing stock is not well aligned to this purpose (Crews & Zavotka, 2006). For example, in the USA, bathroom and kitchen standards were originally based on anthropometrics of healthy military males during world war 2 and have changed little since (Crews, & Zavotka, 2006). Crews & Zavotka (2006), believe that this lack of change is caused by an apprentice trade culture in which the old ways are perpetuated to younger builders. In Australia, Karol (2008) found that new housing being built in Western Australia was predominately designed for the nuclear family and has not significantly varied in 60 years. Byles et al (2012) found that Australian older people's homes did not satisfy objective measures of safety and adaptability. Bathrooms and entrances are areas that commonly present environmental barriers (Byles et al, 2012; Iwarsson, Nygren, Oswald, Wahl & Tomsone, 2006;).

6. Factors relating to ageing and quality of life

Older people commonly describe factors such as health, safety, mobility, capacity to care for self, independence, social relationships, activities and home environment as important to their quality of life (Chin & Quine, 2012; Kalfoss & Halvorsrud, 2009; Borglina, Edberga, & Hallberg, 2005). Many studies measure the importance of these factors by having participants prioritise factors from pre-defined lists (Gabriel & Bowling, 2004). This limits the responses to areas preconceived as important by researchers. However, given the freedom to self-nominate important factors, older people still describe similar themes affecting quality of life, such as good relationships with family, friends and neighbours, health, sufficient money, independence, participating in activities and the quality of home and neighbourhood (Gabriel & Bowling, 2004; Wilhelmson, Andersson, Waern, & Allebeck, 2005).

Given that older people may spend 80% of their time at home (Iwarsson et al., 2007), it is unsurprising that autonomy and choice of housing is nominated as an important factor by older people for their quality of life (Crist, 1999). Many people associate their home with a life-time of happy memories, being the place where they raised their children and entertained their friends (Gabriel & Bowling, 2004; Warnock & Fisher, 2007). Their home is a place where they exercise independence, which is another frequently nominated quality of life factor (Gabriel & Bowling, 2004; Kelleygillespie & Farley, 2007). Also, since environmental factors may have a greater impact older people's well-being, this makes the home environment an especially important mediator of quality of life in older years and particularly for those living alone (Iwarsson et al., 2007).

7. Occupational participation

The term 'occupation' has various definitions within the literature, however, its' meaning is commonly understood to include participation in meaningful activities, including activity relating to self-care, productivity and leisure (Law, Steinwender & Leclair, 1998). ICF describes participation as involvement in life situations (WHO, 2002). In qualitative interviews, older people define participation as exercising personal agency – following

personal routines and preferences and living daily life in a way that aligns with their own values (Witso, Eide & Vik, 2012). Occupational activity is a fundamental part of human life, enabling people to survive and also develop their capacities and flourish (Wilcock, 1993). Removal of occupation has been associated with increased stress and reduced health (Law, et al, 1998). Self-reported satisfaction with participation has been associated with lower levels of emotional distress (Witso et al, 2012).

Participation is important for aged people in order to reduce functional decline (Witso et al, 2012). Additionally, older people report that participating in life through meaningful activities boosts their quality of life (Borglina et al, 2005). They describe participation as something that makes their day meaningful, gives them independence, enables them to feel competent, and enjoy life (Borglina et al., 2005). Engaging in IADLs, leisure and social activities has been shown to be related to reductions in the risk of developing weakness, stiffness and range of motion limitations (Horowitz & Vanner, 2010). Also, social and community engagement has been associated with better psychosocial, and cognitive health (Horowitz & Vanner, 2010; Sirven, & Debrand, 2008).

Social activities are seen as ways to remain busy and engaged in community, volunteer activities are valued for the opportunity to have a role, learn new skills, and feel valued and useful (Gabriel & Bowling, 2004). The importance of social and community participation is also linked to the fact that retired people have more time available to spend socialising and need to socialise in order to maintain their shrinking social networks (Sirven, & Debrand, 2008).

8. Supportive home environment and participation

The quality of physical home environment and the ability to participate in meaningful occupations are both factors that contribute to quality of life in older people, but these two factors may also interact. The home environment may play a role in mediating people's ability to participate in meaningful occupations (Oswald et al., 2007). There is much literature investigating relationships between home characteristics and participation, often focussing on participation in activities of daily living or instrumental activities of daily living,

(I/ADLs) (Iwarsson et al, 1998; Marquardt, Johnston, Black, Morrison, Rosenblatt, Lyketsos, & Samus 2011). I/ADLs are an important area of functioning for older people, given that they spend much of their time at home (Iwarsson et al., 2007). Overall the literature suggests that I/ADL functioning has a relationship with house quality. People who report living in more demanding environments also report having greater difficulty with I/ADLs (Iwarsson et al, 1998; Marquardt et al, 2011). A link between home and I/ADL functioning is also evident in the home modifications literature. Older people who have received home modifications demonstrate more independence in I/ADLs and less decline in I/ADL functioning than their counterparts (Fox, 1995; Liu & Lapane, 2009).

The literature also demonstrates relationships between home environment and social participation, exercise, health, and likelihood of falling (Howden-Chapman et al., 1999; Iwarsson, Horstmann, Carlsson, Oswald, & Wahl, 2009; Pynoos, Steinman, Nguyen, & Bressette, 2012; Tomaszewski, 2013; Wang et al., 2012). However, there appears to be few studies exploring participation across a range of activity domains (as opposed to participation in one domain only), especially with linkage to objective (interviewer rated) measures of house supportiveness.

Vik, Nygard and Lilja (2007) investigated environmental facilitators for broad areas of participation. They included activities such as shopping, gardening and socialising, in addition to I/ADLs, and found that older people nominated home accessibility as an important facilitator of these activities. Witso et al (2012) included I/ADLs, mobility inside the home, outdoor maintenance, leaving the home, exercising, leisure, socialising, community activities, and managing money. They found that perceived barriers in the home were one predictor of whether people would report satisfaction in participation. However, in both of these studies, the measures of house quality were based on self-reported perceptions of participants. Self-report alone may not be reliable, as older people have been shown to rate their homes more highly than objective assessments (Byles et al, 2012).

Home quality has been measured variously throughout the literature in relation to participation. Many studies have used subjective measures of home quality, such as participant's perception of unmet needs for home modifications, satisfaction & usability scales, self-report of physical barriers, or self-rating of home environment (Iwarsson et al., 2009; Liu & Lapane, 2009; Oswald et al, 2007; Rochette, Desrosiers, & Noreau, 2001; Stineman et al., 2011; Vik et al., 2007; Witso et al., 2012). Fewer studies have considered objective, interviewer rated measures of home quality. Interviewer rated measures in the literature have included assessment of barriers, assessment of person–environment fit and observation of the condition of the external parts of the house (Iwarsson et al., 2009; Oswald et al., 2007; Tomaszewski, 2013).

A recent study explored the relationships between subjective and objective measures of home quality, social participation and well-being (Tomaszewski, 2013). The objective measures of home quality used in this study were crowding (number of people per bedroom) and an interviewer rating of the external condition of the building (Excellent, Good, Average, Poor). They found strong relationships between subjective measures of house satisfaction and social participation, but not between objective measures of house quality and social participation. However, the objective measures of house quality were limited and did not address accessibility features.

As the literature currently emphasises self-report measures of home quality and is focussed largely on the relationship with participation in I/ADLs, it is currently unclear what relationships may exist between objective, interviewer rated measures of home supportiveness and participation in a broader range of life pursuits.

9. Statement of the problem

There is evidence that older people who have more supportive homes participate more in activities, particularly activities of daily living and instrumental activities of daily living. However, much of this evidence currently relates to research using self-report measures of home quality. It is unclear what relationships may exist between interviewer-rated measures of home supportiveness and participation in a broad range of life pursuits. Given

the emphasis of Governments and individuals on ageing in place strategies for older people and given the current push to encourage implementation of supportive home principles (such as the liveable housing guidelines) into new buildings, it is important to understand what relationships exist between home building features and successful participation in life for older people.

10. Research aims and questions

The aim of this study is to explore whether the homes older Australian's are supporting people's continued participation in self-care, leisure, community engagement and socialisation.

- 1) Using objective measures based on the Australian Standard for Adaptable Housing (AS4299-1995) and the Liveable Housing Australia Guidelines, how supportive is the existing housing stock occupied by older Australians in this study?

- 2) Do community-dwelling, older Australians, who live in more physically supportive homes, participate more frequently in a variety of meaningful occupations than their peers living in less supportive homes?

11. Scope and implications

This study explores associations between levels of participation in daily activities and objectively measured levels of home supportiveness for a sample of 202 community-dwelling people, aged between 75 and 79 years and living in metropolitan areas in and around Sydney. The study presents a secondary analysis of data collected for the Housing and Independent Living (HAIL) Project (2009) and the data is therefore restricted to what was collected for that project. This study is a cross-sectional design and, as such, cannot demonstrate cause and effect or associations across time.

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SECTION 2: JOURNAL MANUSCRIPT TITLE PAGE

TARGET JOURNAL: Australasian Journal on Ageing

(see Author Guidelines, Appendix. II)

TITLE: Relationships between supportive physical home environment and participation in life activities amongst community-living, older Australians

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Abstract

Objective: To investigate if there are associations between physical measures of home supportiveness and participation in life activities for older Australians.

Method: A secondary analysis of cross-sectional study data from the Home and Independent Living (HAIL) study. This study used a postal survey, home interview and interviewer-rated home assessment data of 202 NSW residents aged over 75 years. Data were analysed using SPSS to determine associations between variables related to supportive home features and frequency of participation in activities.

Results: Homes reviewed in this study demonstrated low levels of supportive built environmental features. There were no significant associations between having a relatively more supportive home and participating more frequently in activities.

Conclusions: Older Australians in this study were participating in a range of activities despite having homes that were not considered supportive using objective measures. This may suggest that current standardised measures of home features are not sufficient to determine how supportive homes are to ensure the participation of older people. Further Australian research exploring relationships between participation and the perceptions of older people about their home supportiveness; participation and home features of people who have functional issues; and participation and combined home and neighbourhood features is needed to fully understand home supportiveness.

Key words - aged, independent living, housing for the elderly, social participation, activities of daily living.

INTRODUCTION

Australians are living longer than ever. The proportion of older people in our population increased from 4% in 1901, to 13.5% in 2010, and is expected to further increase to 21% by 2041 (1). Rates of functional difficulty increase with age, therefore, governments are anticipating increased demands for services, aged housing and care in the future (1). Australian Government expenditure on aged care is predicted to double between 2009 and 2049 (1).

However, some researchers contend that the increase in aged care demand will not be as pronounced as expected because rates of functional decline in older people have reduced over the past twenty years and the portion of old-age spent without disability is increasing (2). Many older people do not need aged-care and are capable of living independently in the community if they receive support and if their home can be adapted as their needs change (3). The majority (90-93%) of older Australians live in the community (4). Remaining in the community (known as 'ageing in place') is therefore a suitable option for much of the population, and is a focus for Governments because it reduces the cost of caring for an ageing population (5). Additionally, the majority of older people report a preference to age in place (6).

Reduced functioning and mobility, such as difficulty walking or using steps, are common issues for older people (6). Much of the literature considers the functioning of older people in terms of disability, and defines disability as being impaired performance of activities of daily living and instrumental activities of daily living (I/ADLs) (2,6,7). However, based on the International Classification of Functioning Disability and Health (ICF), this concept may be better viewed as a restriction of participation in a broad range of life situations (8). Older people report that participating in self-care, community and social activities are all important to them (9). Therefore, ICF is a useful framework for thinking about the functioning of the aged population because it equates health and well-being with the ability to participate in life (8). Under the ICF, limitations in participating are considered to be the result of interactions between health and contextual factors (8). Contextual factors include

the natural, built, social and legal environment and personal characteristics including age, gender and education (8). Therefore, health is seen as more than just an absence of physical disease and instead incorporates environmental factors, personal factors and the ability to participate in life, in addition to bodily factors (8). This is consistent with research that has found that complex relationships exist between older people's personal capacities, their home's environments and healthy ageing outcomes (a Person-Environment model of functioning) (10). The ICF is used as the model guiding this study because it recognises that functional participation is possible if personal capacity and environment are aligned (8).

Engaging in IADLs, leisure and social activities has been shown to be related to greater psychosocial and cognitive health and reduced risk of developing physical limitations (11,12). Given that older people may spend 90% of their time at home, it is unsurprising that the home environment is also frequently nominated as important for quality of life (13). Staying in their home gives older people continuity with their history and the community connections they have built across time, as well as keeping their emotional and spiritual connection to place (3). It also enables older people to be a part of a multi-generational community (3). Since environment can mitigate functional decline (2), supportive home features can help reduce the likelihood that people will discontinue activities, therefore supporting ageing in place and participation in life (14). However, Byles et al (15) found that Australian older people's homes did not satisfy objective measures of safety and adaptability. Additionally, Karol (16) found that new housing in Australia is predominately designed for the needs of the nuclear family and has not significantly varied in design for 60 years.

Various approaches are used to define homes that are more user-friendly. The term housing accessibility refers to homes that have been adapted for ease of use. Examples of accessible features include grab rails in bathrooms and reachable cabinetry in kitchens. Housing visitability refers to homes with features for ease of entrance into the home, movement through the home and access to a toilet on the main floor. Adaptable homes are those which contain flexible features that can accommodate the changing needs of residents. Universal design describes homes that are built to enable all people to use them,

eliminating categories of standard versus accessible (14). A liveable home is defined as one which is easy to enter, to move around within and to adapt as the resident's needs change (17). In this study, we use the term supportive housing to describe housing features that fall into any of these categories.

There is evidence in the literature that better home quality is related to better I/ADL functioning (7,18,19). Research also demonstrates relationships between quality of home and greater social participation, exercise, health, and reduced likelihood of falling (5,13,20-23). Home quality has been measured in various ways throughout the research. Many studies have used subjective measures, whereby residents provide self-ratings of their homes (10,19-22,24,25). Fewer studies have considered objective measures, where homes are rated independently by researchers. Self-report may not be reliable, as older people have been shown to rate their homes more highly than objective assessors do (15). There appear to be few studies exploring relationships between objective measures of house quality and participation across a range of activity domains (rather than one domain only such as I/ADLs).

A recent study investigated relationships between subjective and objective measures of home quality, and social participation and well-being (13). They found strong relationships between subjective measures of house satisfaction and social participation, but not between objective measures of house quality and social participation. However, the objective measures of housing quality used in this study were crowding (number of people per bedroom) and an interviewer rating of the external condition of the building (Excellent, Good, Average, Poor). These measures of house quality may not be strong indicators of house supportiveness.

As the research currently emphasises subjective measures of home quality and is focussed largely on its relationship with participation in I/ADLs, it is currently unclear what relationships may exist between objective measures of home supportiveness and participation in a broader range of life pursuits. The aim of this study was to explore whether the homes older Australian's are supporting people's continued participation in

self-care, leisure, community engagement and socialisation. Specifically, our research questions are:

Using objective gold standard measures based on the Australian Standard for Adaptable Housing (AS4299-1995) (26) and the current Liveable Housing Australia Guidelines (17), how supportive is the existing housing stock occupied by older Australians in this study?

Do community-dwelling, older Australians, who live in more supportive homes, participate more frequently in a variety of meaningful occupations than their peers living in less supportive homes?

Based on findings in the literature to date, we hypothesised that people occupying more supportive homes would participate more frequently in activities.

METHOD

Study Design:

This study was a secondary analysis of existing, cross-sectional data from the Housing and Independent Living (HAIL) Study.

The Hail Study:

The HAIL Study (15), was a cross-sectional study of older people living in the Bankstown, Hunters Hill, Ku-Ring-Gai, Mosman, Sutherland, Woollahra and Wyong areas of NSW Australia. The HAIL study collected measures of participant's home quality, neighbourhood quality and personal functioning. The HAIL data was useful for this study because it incorporated a large, random sample and data about participant's home environment, personal functioning and participation in a variety of occupational areas.

The Current Study:

This study explored relationships between a number of variables. A cross sectional design is useful to describe prevalence of a variable in a population and can also be used to look for relationships between variables (27). A large cross-sectional study, using random sampling,

has a high likelihood of being representative of the population (27). This design is relatively economical in terms of cost and time and can therefore be used to assess multiple variables (27). However, the design is limited in that it provides only a snap-shot of data at a particular time, making it insensitive to change. A cross sectional design does not enable inference of causality (27).

Participants, Recruitment and Data Collection:

The HAIL Study recruited its' participants from a group of people already participating in the 45 And Up Study (<http://www.45andup.org.au>). A total of 400 people were randomly selected from those 45 And Up Study participants who met the following criteria:

1. Aged between 75 and 79 years when they joined The 45 and Up Study
and
2. Lived in the areas of Bankstown, Hunters Hill, Ku-ring-gai, Mosman, Sutherland, Woollahra or Wyong

These suburbs were selected due their relatively high concentrations of people aged 70 years and over (28). Those selected were posted a survey and invitation to participate in HAIL. Two hundred and sixty people returned the survey and were then invited via telephone to participate in a home visit interview and home assessment. Of these, 202 people participated in the home visit (28). The present study used data collected from these 202 people.

Demographic Information:

Demographic data were collected via postal survey and supplemented with an interview during the home visit. The SF36 Health Survey (SF36) was administered to collect data on health status. The SF36 is a standardised survey which uses a multi-item scale to measure health in terms of people's physical function, role limitations (due to physical or emotional problems), body pain, general health, vitality, social function, and mental health (29). Reliability and validity have been demonstrated for the SF36 (29).

Key Variables:

PARTICIPATION

The ICF describes participation as being involved in life situations (8). Participation may be categorised into various domains, such as self-care, leisure, social and community engagement (30), this study focussed on each of those four domains.

The Late Life Function and Disability Instrument (LLFDI) is a self-report measure of functioning and disability for community living, older adults (31). It has demonstrated predictive validity against objective measures of function (31). It comprises a function section reporting a person's level of difficulty performing physical functions, and a disability section reporting both the level of difficulty in participating in activities (limitation dimension) and how frequently the person participates in activities (frequency dimension). Raw scores are scaled 0-100 (31).

The frequency dimension of the disability section of LLFDI was of interest in this study because it included questions about the frequency of participating in various activities. Within the frequency dimension, LLFDI categorises items as relating to either social or personal roles. However, the nature of these items made them easily categorised into the domains required for this study - being social participation, self-care, leisure and contribution to community. Data from the items in this section were therefore categorised into these four domains of activity, as shown in table 1, and used to measure the frequency of occupational participation. LLFDI response options for each activity were: 1) never, 2) almost never, 3) once in a while, 4) often or 5) very often. We operationalised 1, 2 and 3 as representing infrequent participation in the activity, and 4 and 5 as representing frequent participation in the activity.

HOME SUPPORTIVENESS

Drawing from various approaches used to define homes that are more user-friendly, we measured home supportiveness in the following three different ways:

- 1) From the Australian Standard for Adaptable Housing (AS4299-1995) checklist (26) - homes that had less than the overall group average number of adaptable housing features versus houses that had average-plus number of features.
- 2) From the Australian Liveable Housing Guideline (17) - homes that had less than the overall group average number of liveable housing features versus houses that had average-plus number of features.
- 3) Homes that were single storey versus multi-storey.

Australian Design for Access and Mobility Standard (AS 4299-1995)

The AS 4299-1995 is published by Standards Australia and provides guidance on adaptable building design elements such as door thresholds, corridor widths and manoeuvring space (26). Included with this standard is a 119-item checklist to rate how many adaptability elements a home has. A 40-item derivative of this checklist was completed by researchers during home visits in the HAIL Study as an objective measure of home supportiveness. Checklist items were as outlined in table 1. We used SPSS to divide participant's data into two groups – houses with less than the overall group average number of features and houses with average-plus number of features. The average-plus group of homes were defined as being relatively more supportive.

Liveable Housing Design Guidelines

This guideline was created by Liveable Housing Australia (17), which is a group that comprises consumers, government and industry. Using the guideline, a home may be graded in terms of its' liveability ('silver', 'gold' or 'platinum' rating). The guideline comprises 16 performance statements (Appendix I) that each list elements considered to be important for ensuring the home can support people's changing needs.

This study did not collect data using this guideline. We therefore applied data collected using the Australian Standard Adaptable Housing AS 42991 checklist and the Home Falls and Accidents Screening Tool (HOMEFAST) to estimate performance of homes against the

Liveable Housing performance statements. The 16 design statements and the measurement used by this study for each are outlined in Table 1.

HOME FAST

The HOME FAST is a 25-item checklist used to screen for home and personal risk-factors commonly associated with falls in older people (32). Reliability and validity has been demonstrated for the HOMEFAST (32). The checklist is scored 0-25, and items such as accessibility, floor coverings and safe furnishings and foot-wear are included. As shown in Table 1, the present study used some observations from this tool to establish performance against the Liveable Housing Design Guideline.

Home Type

Interviewers observed whether the home was:

- 1) Townhouse
- 2) Ground floor flat
- 4) Flat accessed by stairs
- 5) Single level villa or house
- 6) 2+ storey house"

Options 2 & 4 were operationalised as single storey homes. Options 1, 3 & 5 were operationalised as multi-storey homes.

[Insert Table 1. Measurement of Key Variables]

Data Analysis:

Data were analysed using SPSS. Means and 95% confidence intervals were calculated for continuous scores, and normal distributions were evaluated. Chi-Squared tests ($p < 0.05$) were used to explore associations between home supportiveness (using scores from the AS 4299-1995 checklist and the Liveable Housing performance elements and using staired vs level homes) and occupational participation (using questions from the disability section of LLFDI).

Ethical review:

HAIL data was received in a de-identified in electronic format and stored on the researcher's computers with password protection. Ethical approval was received from University of Newcastle Human Research Ethics Committee H-2009-0209.

RESULTS

Participant Characteristics

Demographic characteristics of the participants are represented in Table 2. Participants were aged between 75-79 years and were almost evenly divided between genders. Most people were retired, married and not living alone. The majority of people were able to mobilise without a walking aid and independently drive. As shown in table 3, men were less likely to be living alone than women and more likely to be living with a spouse. Men were more likely to report independence in driving than women. Overall, participants reported good health. Mean scores on the majority of SF36 factors compared favourably with standardised mean scores for the 65+ age group. The exceptions were men's scores for the factors of vitality (62.2), bodily pain (66.5) and role physical (58.7), which were all slightly below normalised means. However, 95% confidence interval scores for these factors did cross standardised means.

Participants were unevenly dispersed between suburbs. The largest proportions of participants were from the Central Coast and Sutherland areas, followed by Hornsby and

Canterbury Bankstown. Few people from Mosman, Hunters Hill and Sydney's Eastern suburbs participated. Most people had lived in their homes and suburbs for many years.

[Insert Table 2. Demographic Characteristics of Participants]

[Insert Table 3. Relationship Between Features of the Home Environment and Living Situation of Participants]

Housing Supportiveness

More than half of people reported living in a single-storey home. The majority of people liked their neighbourhood (93.6%), felt that their home was a good base for their activities (97%) and had no plans to move (82.7%). Approximately one third of people (32.7%) reported believing that their housing needs would change in future and most (84.2%) felt that they would be able to modify their home if needed. As shown in Table 4, people's homes on average had fewer than half of the AS 4299-1995 Adaptable Housing Standard features and fewer than half of the Liveable Housing Performance Elements reviewed.

AS 4299-1995 Adaptable Housing Standard:

Based on the AS 4299-1995 Adaptable Housing Standard checklist, bathrooms had far fewer adaptable features than any other area of the homes. On average, homes had 4.6 of the 13 bathroom adaptable features. In particular, only 4% of people had provision for a folding

seat in their shower, 20% with a grab rail in the shower, 21% with a hobbles accessible shower recess and 22% with slip-resistant floor surfaces.

Liveable Housing Guidelines:

On average homes had 6.8 out of a possible 16 features addressing liveable housing guideline elements. Only two homes had features that addressed all silver-level (lowest rating) liveable housing performance elements. Six homes had no silver-level features. No homes addressed the full criteria for gold level rating (being an accumulation of all silver elements plus all gold elements) or for platinum-level (being an accumulation of all silver elements plus all gold elements plus all platinum elements).

People reported liking their neighbourhood and feeling that their home was a good base for their activities. Most people reported that they had no plans to move home, with females and people living in Canterbury/Bankstown the least likely to report having plans to move. Approximately one third of people predicted that their housing needs would change in the future, and people living in multi-storey homes were the most likely to expect this. The majority of people felt confident that they would be able to modify their home in the future if they needed to.

[Insert Table 4. Characteristics of Homes]

Participation

Overall, people reported moderately frequent levels of participation in activities and mild levels of limitation in capacity to participate. Mean LLFDI total frequency dimension score was 53.9 (95% CI: 52.9-54.8) and total limitation dimension score 78.2 (95% CI: 76.2-80.3) out of a possible 100. There was no gender difference in participation frequency ($p=0.17$) or limitation ($p=0.77$) and no difference between married and single people in frequency ($p=0.45$) or limitation ($p=0.75$).

Association Between Home Supportiveness And Frequency Of Participation In Activities

Table 5., presents correlations between frequent participation in activities and: 1) higher/lower scores on the Australian Standard for Adaptable Housing (AS4299-1995) checklist, 2) higher/lower scores on the Australian Liveable Housing Rating Standard and 3) having a single storey or multi-storey home.

1) HOME ADAPTABILITY

With the exception of a single self-care domain factor “*How often do you take care of errands?*”, there were no significant relationships between having a relatively higher score against the Australian Standard for Adaptable Housing (AS4299-1995) checklist and participating frequently in activities. More participants with home scores above the mean for the AS4299-1995 checklist reported participating frequently in the activity of taking care of errands.

2) HOME LIVEABILITY

There were no significant relationships between having a relatively higher score against the Australian Liveable Housing Rating and participating frequently in activities.

3) HOUSE TYPE

There were no significant relationships between having a single storey or multi-storey home and participating frequently in activities.

[Insert Table 5. Relationships between home type and frequent participation in activities]

DISCUSSION

How Supportive Is The Existing Housing Stock For Older People?

It appears that the existing homes of Australian elders are not well designed to support their changing needs. In terms of adaptability and liveability standards, the housing stock reviewed in this study had low levels of supportiveness. Only two of the 202 houses had features that would address the requirements for silver-level rating under the Australian Liveable Housing Guideline. No homes had sufficient features to warrant a rating above silver. Additionally, homes had low levels of recommended items from the Australian Adaptability Standard. Homes particularly lacked adaptability features in bathrooms. Despite this, most people rated their homes highly, had lived there for many years and had no plans to move. This is consistent with other research which has shown that older people tend to rate their home quality more highly than objective raters do (15).

Is There A Relationship Between Objectively Assessed Housing Supportiveness And Older People's Participation Levels?

We found no relationship between objectively assessed home supportiveness and older people's participation levels. People reported similar levels of participation in social, self-care, community and leisure activities regardless of whether they lived in single or multi-storey homes, homes that scored more highly or less highly against the Australian Liveable Housing or against the Australian Standard for Adaptable Housing.

It was expected that a link would be found, given that there are a number of overseas studies demonstrating links between home quality and participation levels. One explanation could be that the perceptions of older people about the supportiveness of their home are more important to their participation levels than objectively measured home qualities. Much of the existing participation literature used subjective measures of house quality, whilst this study used objective measures. This is consistent with studies that have suggested a link between healthy ageing and a combination of perceived and objective home quality (10). Additionally, the level of social support available at home may underpin

a positive perception about home quality for older people and enable their readiness to participate in activities.

Another explanation may be that standardised measures of home quality as used in this study are not useful for determining home supportiveness. A home assessment modelled on a Person-Environment interaction may better determine any home - participation link. This would be consistent with falls literature which finds that fallers and non-fallers have similar numbers of barriers in their homes, however, fallers have poorer person-environment fit than non-fallers (22). As the study participants reported relatively good health, it is possible that objectively measured home supportiveness is more important for a sub-group of older people who are less well. Some research has found that the degree of difficulty people experience accessing their homes is more relevant to healthy ageing outcomes than the number of environmental barriers present (10).

The literature also finds links between neighbourhood quality and participation levels. One literature review found that community factors such as closely located parks, grocers, banks, post offices and malls related to greater levels of walking and socialising for older adults (5). It is possible that objectively measured home quality operates in concert with neighbourhood factors to support activity.

There are characteristics about our sample that may contribute to the lack of a home-participation link. Firstly, participants were 75 years or older and still living in the community. This group may represent people who have already successfully adapted to life and are resilient to the challenges of ageing. Boldy et al (33) found that the proportion of older people reporting plans to continue living at home increased with age (37% for 55-65yrs, 62% for 75+yrs). Secondly, HAIL participants who agreed to complete the home visit were concentrated in the areas of Central Coast, Sutherland, Hornsby and Canterbury Bankstown. Few HAIL participants from the more affluent areas of Mosman, Hunters Hill and Sydney's Eastern suburbs participated in the home visit portion of the study. It is possible there are systematic differences between these groups, for example perhaps living

in areas where people are more closely co-located and better served by public transport may impact reported participation levels.

Limitations

There are a number of limitations to this study. The study was cross-sectional and therefore not capable of demonstrating causal mechanisms. Additionally, the Australian Standard for Adaptable Housing checklist used to measure home supportiveness does not prescribe a method for scoring homes. We therefore imposed a below/above average system. The Australian Liveable Housing guideline does have a rating system, however homes in this study overall did not rate highly enough against this tool to make the rating system useful for discerning high/low groups within our data. We therefore imposed an above/below average rating, which is not prescribed for this tool. Scores on the Australian Liveable Housing Guideline were estimates only, using data from other tools. Data representing the four individual areas of participation were extracted from the LLFDI tool and scored in a manner not prescribed for that tool. Participants were not evenly dispersed between suburbs and all were from city suburbs. This limits generalisability of results to other areas, particularly rural regions. Participants were in good health and had only minor functional impairments. Exploration of these variables with less functional participants may yield different outcomes.

Implications

Our findings suggest that older Australians are participating in activities despite having homes that are not rated as supportive. The use of standard measures of home quality may not be sufficiently informative for Governments and other interested parties seeking to identify optimal housing arrangements for our ageing population and their quality of life. Reviewing the number of supportive features in homes independently of the functional status of older people may give little indication of their ability to continue to participate in life activities within and outside of the home.

More research in Australia is needed to explore objective measures of home quality as they relate to participation levels for older people. Such research should explore any links between 1) the perceptions of older people about home quality and their participation, 2) the health/functional status, home quality and participation of older people, and 3) combined measures of the home and neighbourhood and participation.

Key Points

- The existing housing stock inhabited by older Australians in this study did not rate highly against objective measures of home supportiveness.
- This study found no associations between objectively measured home supportiveness and frequency of participation in a wide variety of activities in older Australians.
- Policies for meeting the housing needs of Australia's ageing population should not rely solely on standardised ratings of home accessibility features to predict people's functional outcomes.

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TABLES

Table 1: Measurement of variables

The Late Life Function and Disability

Instrument

Use of LLFDI items for analysis of participation

Self-Care:

“How often do you take care of inside of your home?”

“How often do you take care of household business, finances?”

“How often do you take care of your own health?”

“How often do you take care of your own personal care needs?”

“How often do you take care of local errands?”

“How often do you prepare meals for yourself?”

Socialising:

“How often do you keep in touch with others through letters, telephone, email?”

“How often do you visit friends and family in their homes?”

“How often do you invite people into your home for a meal or entertainment?”

“How often do you go out with others to public places such as restaurants or movies?”

“How often do you take part in organised social activities?”

Leisure:

“How often do you take part in active recreation?”

“How often do you travel out of town for at least an overnight stay?”

“How often do you take part in a regular fitness program?”

Community:

“How often do you provide care or assistance to others?”

“How often do you work at a volunteer job outside your home?”

Liveable Housing Design Guidelines

Design statement:

Measurement used:

A safe and continuous pathway from the street entrance

HOMEFAST: Paths around house in good repair?

Level entrance

AS 4299-1995: Accessible entry is level (ie max. 1:40)?

Any parking space should allow easy movement around the vehicle

Not measured

Internal doors & corridors facilitate unimpeded movement between spaces

AS 4299-1995: Internal corridors 1000mm

Entry level has toilet	AS 4299-1995: Accessible toilet
Bathroom and shower designed for easy and independent access	AS 4299-1995: Shower recess no hob, 1160 x1100
Bathroom and toilet walls are built to enable grabrails	AS 4299-1995: Grab rail in shower
Stairway design reduce likelihood of injury	HOMEFAST C3r: Indoor stairs have rail along the full length
Kitchen space supports ease of movement	AS 4299-1995: 1550 mm clear between benches
Laundry space is designed to support ease of movement	Not measured
A space on entry level can be used as a bedroom.	HOMEFAST: Can the person get in and out of bed easily and safely?
Switches & powerpoints are at heights that are easy to reach	HOMEFAST: Can the person switch a light on easily from their bed?

Easily open doors and safely use tap hardware	AS 4299-1995: Tap 300 mm from front of kitchen sink
Living room has space to enable move around	HOMEFAST: Can the person get up from their lounge chair easily?
Windows sills height	Not measured
Floor coverings are slip resistant	HOMEFAST: Floor surfaces non slip

Australian Design for Access and Mobility Standard (AS 4299-1995)

Checklist items used:

A level or gently sloping site with up to 1:14 gradient
Entry protected from weather by porch

Accessible entry is level (ie max. 1:40 slope)
Threshold is low-level
Landing enables wheelchair manoeuvrability
Accessible entry door to have 850 mm min. clearance
Weatherproofed entry door
Internal doors to have 820 mm min.

clearance

Internal corridors min. width of 1000mm

Minimum width 2.7 m (1550 mm clear between benches)

Benches include at least one work-surface of 800 mm length, from 750 mm to 850 mm high.

Refrigerator adjacent to work surface.

Kitchen sink from 750 mm to 850 mm high.

Kitchen sink bowl max. 150 mm deep

Tap set capstan or lever handles or lever mixer

Tap set located within 300 mm of front of sink

Installation of thermostatic mixing valve

Cook tops to include either front or side controls with raised cross bars

Cook tops to include isolating switch

Work-surface min. 800 mm length adjacent to cook top at same height

Central light with second light over sink. Potential illumination adequate over work surfaces

Shelving/storage depth of 600 mm max. No more than 800 mm to 1500 mm above floor.

Slip resistant floor surface

Shower recess – no hob. Min. size 1160 X 1100 to comply with AS 1428.1

Recessed soap holder

Shower taps positioned for easy reach to access side of shower sliding track

Shower waste min. 80 mm diameter

Adjustable, detachable hand held shower rose mounted on a slider grab-rail or fixed hook

Grab rail in shower to comply with AS1428

Folding seat in shower to comply with AS

1428.1

Tap sets to be capstan or lever handles with single outlet

Installation of thermostatic mixing valve

Provision for washbasin with clearances to comply with AS 1428.1 (not within a vanity unit).

Wall cabinet with light over or similar

Double plug socket beside a mirror

Accessible toilet (space in front and beside toilet to allow transfer from a wheelchair or access with a walking aid).

Grab rail beside toilet to comply with AS

1428.1

Slip resistant floor surface.

Oven located adjacent to a work surface

Microwave oven at height of 750 mm – 1200 mm above floor

Table 2: Demographic Characteristics of Participants (N=202)

	(n)	Percentage (%); Mean (95% C.I)
MEAN AGE (n = 201)		77.3 (77.1 – 77.5)
GENDER (n = 201)		
Female	110	54.7%
Male	91	45.3%
MARITAL STATUS (n = 200)		
Married	131	64.9%
Unmarried/divorced	27	13.3%
Widowed	42	20.8%
LIVING ARRANGEMENTS (n = 202)		
Living Alone	55	27.2%
Men (all men = 91)	13	14.3%
Women (all women = 110)	42	38.2%
Living with Spouse	133	65.8%
Men (all men = 91)	76	83.5%
Women (all women = 110)	57	51.8%
RETIRED FROM WORK (n = 201)	179	88.6%
Male		85.7%
Female		91.8%
SUBURB/AREA (n = 202)		
Canterbury Bankstown	26	12.9%
Central Coast	51	25.3%
Sydney Eastern Suburbs	9	4.5%
Hornsby	39	19.3%

Hunters Hill	1	0.5%
Mosman	4	2%
Sutherland	51	25.2%
PERSONAL MOBILITY (n= 174)		
Uses a walking aid	15	7%
DRIVING STATUS (n= 202)		
Drives self	156	77.2%
Men drives self	81	89.0%
Women drives self	75	68.2%

TIME IN CURRENT HOME (Mean years, 95% CI)
24.9 (21.7 – 26.9)

TIME IN CURRENT AREA (Mean years, 95% CI)
38.3 (35.0 – 41.5)

Canterbury/Banks	38.2 (30.3 – 46.1)	40.5 (32.9 – 48.2)
Central coast	16.8 (13.5 – 20.2)	19.75 (15.5 – 24.0)
Eastern Suburbs	18.5 (0 – 37.6)	45.8 (24.0 – 67.7)
Hornsby	24.5 (18.2 – 30.8)	38.0 (32.4 – 45.6)
Mosman	13.7 (0 – 31.1)	52.0 (0 – 109.1)
Sutherland	30.2 (24.2 – 36.1)	58.88 (54.1 – 63.7)

Table 3: Relationship Between Features of the Home Environment and Living Situation of Participants (N = 202)

	Gender % (n)	Suburb/area % (n)	Type of home % (n)
Time (years) in current home	P = 0.80 Men mean: 24.6 Women mean: 25.2		P = 0.01* Single storey occupants: 28.6 Multi-storey occupants: 21.8
Time (years) in current suburb/area	P = 0.87 Men mean: 38.0 Women mean: 38.7		P = 0.51 Single storey occupants: 37.7 Multi-storey occupants: 40.0
Believes they will be able to modify house if needed	P = 0.35 Men 87.2% (n=86) Women 91.3% (n=104)	P = 0.00** Canterbury/Banks: 83.3% (n = 22) Central coast: 89.1% (n = 44) Eastern Suburbs: 100% (n = 6) Hornsby:	P = 0.84 single storey 89.7% (n=107) multi-storey 89% (n=73)

84.0% (n = 35)
 Mosman:
 100% (n = 4)
 Sutherland:
 92.1% (n = 48)

Believes their housing needs will change in future

P = 0.07

Men 41.7% (n=84)
 Women 29.1% (n=103)

P = 0.19

Canterbury/Banks: 12.5% (n = 22)
 Central coast:
 42.8% (n = 44)
 Eastern Suburbs: 14.3% (n = 6)
 Hornsby:
 36.1% (n = 35)
 Mosman:
 25.0% (n = 4)
 Sutherland:
 43.7% (n = 48)

P = 0.01*

single storey 26.4% (n=106)
 multi-storey 45.8% (n=72)

Planning to move

P = 0.01*

Men 26.1% (n=88)
 Women 10.9% (n=110)

P = 0.05*

Canterbury/Banks: 0% (n = 22)
 Central coast:
 17.6% (n = 44)
 Eastern Suburbs: 0% (n = 6)
 Hornsby:
 18.4% (n = 35)
 Mosman:

P = 0.12

single storey 14.5% (n=110)
 multi-storey 20.5% (n=78)

25.0% (n = 4)
 Sutherland:
 26.0% (n = 48)

*Significant at <0.05.. **Significant at <0.01

Table 4: Supportive Features of Homes

	Total (n)	Percentage (%); Mean & 95% C/I
TYPE OF HOME		
Single storey	111	55%
Multi storey	79	39.1%
Caravan/Other	8	4%
NUMBER OF AS 4299-1995 FACTORS (score out of 40) ¹	202	17.46
NUMBER OF AS 4299-1995 EXTERNAL HOUSE ACCESS FACTORS (score out of 7)	202	3.2 (3.0 – 3.3)
NUMBER OF AS 4299-1995 INTERNAL ACCESS HOUSE FACTORS (score out of 2)	202	0.6 (0.5 – 0.7)
NUMBER OF	202	8.4

AS 4299-1995 KITCHEN FACTORS (score out of 15)		(8.0 – 8.8)
NUMBER OF AS 4299-1995 BATHROOM FACTORS (score out of 13)	202	4.6 (4.3 – 4.9)
NUMBER OF AS 4299-1995 TOILET FACTORS (score out of 3)	202	0.7 (0.6 – 0.8)
NUMBER OF LIVEABLE HOUSING PERFORMANCE ELEMENTS (score out of 16)	202	6.8
NUMBER OF SILVER-LEVEL LIVEABLE HOUSING PERFORMANCE ELEMENTS (score out of 7)	202	3.1 (2.9 – 3.4)
NUMBER OF GOLD-LEVEL LIVEABLE HOUSING PERFORMANCE ELEMENTS (score out of 4)	202	2.5 (2.4 – 2.6)
NUMBER OF PLATINUM-LEVEL LIVEABLE HOUSING PERFORMANCE ELEMENTS (score out of 2)	202	1.1 (1.0 – 1.2)

Table 5: Relationships between home type and frequent participation in activities

Participation	Home Adaptability (AS4299) Below Average Group	Home Adaptability (AS4299) Above Average Group	P value	Liveability - Below Average	Liveability - Above Average		House Type – single storey	House Type – multi storey	
SELF CARE									
“How often do you prepare meals for yourself?”	Frequent = 89.3%	Frequent = 84.6%	0.34	Frequent = 90.1%	Frequent = 83.6%		Frequent = 90.1%	Frequent = 83.6%	P = 0.18
“How often do you take care of household business, finances?”	Frequent = 78.6%	Frequent = 76.9%	0.78	Frequent = 74.7%	Frequent = 80.0%	P = 0.18	Frequent = 74.7%	Frequent = 80.0%	0.37
“How often do you take care of inside of your home?”	Frequent = 89.3%	Frequent = 82.7%	0.20	Frequent = 90.1%	Frequent = 81.6%	0.37	Frequent = 90.1%	Frequent = 81.6%	0.09
“How often do you take care of your own health?”	Frequent = 97.6%	Frequent = 96.6%	0.67	Frequent = 97.8%	Frequent = 96.4%	0.09	Frequent = 97.8%	Frequent = 96.4%	0.55
“How often do you take care of your	Frequent = 97.6%	Frequent = 99.1%	0.38	Frequent = 97.8%	Frequent = 99.0%	0.55	Frequent = 97.8%	Frequent = 99.0%	0.45

own personal care needs?"

“How often do you take care of local errands?”	Frequent = 86.9%	Frequent = 94.9%	0.04*	Frequent = 92.3%	Frequent = 90.9%	0.45	Frequent = 92.3%	Frequent = 90.9%	0.72
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LEISURE

How often do you take part in active recreation?	Frequent = 71.4%	Frequent = 69.2%	0.74	Frequent = 67.0%	Frequent = 72.7%	0.72	Frequent = 67.0%	Frequent = 72.7%	0.38
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How often do you travel out of town for at least an overnight stay?	Frequent = 17.8%	Frequent = 23.1%	0.37	Frequent = 23.1%	Frequent = 19.1%	0.38	Frequent = 23.1%	Frequent = 19.1%	0.49
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How often do you take part in a regular fitness program?	Frequent = 41.0%	Frequent = 46.1%	0.47	Frequent = 41.1%	Frequent = 46.4%	0.49	Frequent = 41.1%	Frequent = 46.4%	0.46
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SOCIAL

“How often do you keep in touch with others through letters, telephone, email?”	Frequent = 89.2%	Frequent = 91.4%	0.60	Frequent = 89.0%	Frequent = 91.8%	0.46	Frequent = 89.0%	Frequent = 91.8%	0.50
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“How often do you	Frequent =	Frequent =	0.65	Frequent =	Frequent =	0.50	Frequent =	Frequent =	0.55
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visit friends and family in their homes?"	65.5%	62.4%		65.9%	61.8%		65.9%	61.8%	
"How often do you invite people into your home for a meal or entertainment?"	Frequent = 51.2%	Frequent = 52.6%	0.84	Frequent = 49.4%	Frequent = 54.1%	0.55	Frequent = 49.4%	Frequent = 54.1%	0.51
"How often do you go out with others to public places such as restaurants or movies?"	Frequent = 61.9%	Frequent = 60.9%	0.88	Frequent = 62.6%	Frequent = 60.2%	0.51	Frequent = 62.6%	Frequent = 60.2%	0.72
"How often do you take part in organised social activities?"	Frequent = 51.2%	Frequent = 52.6%	0.84	Frequent = 69.2%	Frequent = 66.4%	0.72	Frequent = 69.2%	Frequent = 66.4%	0.66
COMMUNITY						0.66			
"How often do you work at a volunteer job outside your home?"	Frequent = 33.3%	Frequent = 33.6%	0.97	Frequent = 35.2%	Frequent = 32.1%	0.65	Frequent = 35.2%	Frequent = 32.1%	0.65
"How often do you	Frequent =	Frequent =	0.85	Frequent =	Frequent =	0.30	Frequent =	Frequent =	0.30

provide care or assistance to others?"	51.2%	52.6%	56.0%	48.6%	56.0%	48.6%
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*Significant at <0.05.. **Significant at <0.01

APPENDIX I

LIVABLE HOUSING AUSTRALIA DESIGN GUIDELINE – DESIGN ELEMENTS

(Available from: <http://livablehousingaustralia.org.au/design-guidelines/>)

Design Element		Silver	Gold	Platinum
1	There is a safe, continuous, level and step-free path of travel from the street entrance and/or parking area to your home's entrance.	✓	✓	✓
2	There is at least one step-free entrance into your home.	✓	✓	✓
3	Where access to your home is through the car park, the parking space has been designed to ensure you can fully open your car doors and move around the vehicle with ease.	✓	✓	✓
4	Internal doors and corridors facilitate comfortable and unimpeded movement between spaces.	✓	✓	✓
5	A toilet on ground or entry level supports easy access for both home occupants and visitors.	✓	✓	✓
6	The bathroom and shower has been designed for easy and independent access for everyone in your home.	✓	✓	✓
7	The bathroom and toilet walls are built to enable grabrails to be installed in the future.	✓	✓	✓
8	Stairways are designed to reduce the likelihood of injury and also enable future adaptation.	✓	✓	✓
9	The kitchen space has been designed to support ease of movement and to support easy adaptation.	⊙	✓	✓
10	The laundry space has been designed to support ease of movement and to support easy adaptation.	⊙	✓	✓
11	There is a space on the ground or entry level that can be used as a bedroom.	⊙	✓	✓
12	Light switches and power points are easy for everyone in your home to reach and operate.	⊙	✓	✓
13	Handles and hardware on doors and tapware have been designed to make them easy for you to open and close.	⊙	✓	✓
14	The family/living room features clear space to enable you to move in and around the room with ease.	⊙	⊙	✓
15	Windows sills are installed at a height that enables you to view the outdoor space from either a seated or standing position.	⊙	⊙	✓
16	Floor coverings are slip resistant to reduce the likelihood of slips, trips and falls in the home.	⊙	⊙	✓

APPENDIX II

AUTHOR GUIDELINES – AUSTRALASIAN JOURNAL ON AGEING

1. AIMS AND SCOPE

Australasian Journal on Ageing is the official English language journal of the Australian Association of Gerontology, Aged and Community Services Australia, Australian Council on the Ageing, and the Australian and New Zealand Society for Geriatric Medicine, and publishes original research articles dealing with any area of gerontology and geriatric medicine. The Journal publishes papers in the following categories (word limits include text but not references, tables or figure legends). For each category implications for policy and/or practice must be drawn out.

Frequency: 4 times per year

2. EDITORIAL REVIEW AND ACCEPTANCE

The acceptance criteria for all papers are the quality and originality of the research and its significance to our readership. Except where otherwise stated, manuscripts are double-blind peer reviewed by at least two anonymous reviewers and the Editor. Final acceptance or rejection rests with the Editors, who reserve the right to refuse any material for publication.

Manuscripts should be in a clear, concise, direct style. Where contributions are judged as acceptable for publication on the basis of content, the Editor and the Publisher reserve the right to modify typescripts to eliminate ambiguity and repetition and improve communication between author and reader. If extensive alterations are required, the manuscript will be returned to the author for revision.

The *Australasian Journal on Ageing* employs a plagiarism detection system. By submitting your manuscript to this journal you accept that your manuscript may be screened for plagiarism against previously published works.

3. PRE-SUBMISSION RESOURCES

Author Services

Prior to submission, we encourage you to browse the 'Author Resources' section of the Wiley Blackwell 'Author Services' website:

<http://authorservices.wiley.com/bauthor/author.asp>.

This site includes useful information covering such topics as copyright matters, ethics, electronic artwork guidelines, and how to optimise articles for search engines.

Pre-submission English-language editing

Authors for whom English is a second language may choose to have their manuscript professionally edited before submission to improve the English. A list of independent suppliers of editing services can be found on the Author Services web pages

(http://authorservices.wiley.com/bauthor/english_language.asp.) Japanese authors can also

find a list of local English improvement services at

<http://www.wiley.co.jp/journals/editcontribute.html>. All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

4. MANUSCRIPT PREPARATION

Manuscript categories

i. Original Research Articles

Word limit: 3,000 words maximum, excluding abstract and references

Abstract: 150 words maximum; must be structured, preferably under the headings:

Objective(s), Method, Results, Conclusion(s).

References: Maximum of 30 references.

Figures/Tables: Total of no more than 5 figures and tables.

Description: Full-length reports of quality current research within any area of gerontology

and geriatric medicine. Key Points must be included – these are 3-4 dot-points which outline the essential take-home messages of the paper.

ii. Brief Reports

Word limit: 1,500 words maximum, excluding abstract and references

Abstract: 150 words maximum; must be structured, preferably under the headings:

Objective(s), Method, Results, Conclusion(s).

References: Maximum of 20 references.

Figures/Tables: Total of no more than 2 figures or tables

Description: Priority will be giving to brief research reports. Key Points must be included – these are 3-4 dot-points which outline the essential take-home messages of the paper.

iii. Review Articles

Word limit: 4,000 words maximum, excluding abstract and references

Abstract: 150 words maximum; must be structured, preferably under the headings:

Objective(s), Method, Results, Conclusion(s).

References: Maximum of 50 references

Figures/Tables: Total of no more than 5 figures and tables.

Description: Reviews are comprehensive, and preferably systematic, analyses of the literature in specific research areas related to gerontology or geriatric medicine. Key Points must be included – these are 3-4 dot-points which outline the essential take-home messages of the paper.

iv. Policy and Practice Updates

Word limit: 3,000 words maximum, excluding abstract and references

Abstract: 150 words maximum; if relevant, structured under the headings: Objective(s),

Method, Results, Conclusion(s)

References: Maximum of 20 references

Figures/Tables: Total of no more than 5 figures and tables.

Description: Policy and practice updates are articles by an expert in the field which aim to

update readers in the areas of professional practice or policy, and must be evidence based. Priority will be given to brief updates of up to 1500 words.

v. Innovations in Aged Care

Word limit: 3,000 words maximum, excluding abstract and references

Abstract: 150 words maximum; if relevant, structured under the headings: Objective(s), Method, Results, Conclusion(s)

References: Maximum of 20 references

Figures/Tables: Total of no more than 5 figures and tables.

Description: Articles which describe and evaluate an innovation. Innovations can include new treatments, community and residential care programs, professional training courses and social policies, and must be evidence based. Priority will be given to brief reports of up to 1500 words.

vi. Letters to the Editor

Word limit: 400 words maximum

Abstract: No abstract required for this manuscript type

References: 10 maximum

Figures/Tables: 1 maximum

Description: Letters must offer perspective to content published in the Australasian Journal on Ageing or information critical to a certain area. A Letter must reference the original source, and a Response to a Letter must reference the Letter in the first few paragraphs.

Letters can use an arbitrary title, but a Response must cite the title of the Letter: e.g.

Response to [title of Letter]. This ensures that readers can track the line of discussion.

Letters may be edited and are subject to reply.

vii. Invited Commentaries (only by invitation of Editors)

Word limit: 1000 words maximum

Abstract: No abstract required for this manuscript type

References: 5 maximum

Figures/Tables: 1 single panel figure or 1 table

Description: Invited articles which provide commentary on accepted manuscripts which have particular relevance to our readership. By Editor invitation only.

viii. Editorials (only by invitation of Editors)

Word limit: 1,500 words maximum

Abstract: No abstract required for this manuscript type

References: 5 maximum

Description: On policy or practice, by Editor invitation only.

ix. Reflections

Word limit: 30 lines for poetry/1000 words for stories.

Abstract: No abstract required for this manuscript type

Description: Poems or stories (fiction or non-fiction) related to any aspect of ageing, whether from the point of view of a health care worker or older person or patient, or simply an observer, will be considered. Poems and stories should be original, not previously published or under consideration elsewhere. A title page with full author details will also be required.

Manuscript style

The acceptance criteria for all papers are the quality and originality of the research and its significance to our readership. Except where otherwise stated, manuscripts are double-blind peer reviewed by two anonymous reviewers and the Editor. Final acceptance or rejection rests with the Editorial Committee, who reserve the right to refuse any material for publication.

Manuscripts should be written so that they are intelligible to the professional reader who is not a specialist in the particular field. They should be written in a clear, concise, direct style. Where contributions are judged as acceptable for publication on the basis of content, the Editor and the Publisher reserve the right to modify typescripts to eliminate ambiguity and repetition and improve communication between author and reader. If extensive alterations are required, the manuscript will be returned to the author for revision.

Authors are encouraged to ensure their studies conform to accepted best practice guidelines such as:

CONSORT [guidelines](#) for reports of randomised trials and cluster randomised trials

STROBE [statement](#) for observational studies (cohort, case–control, or cross-sectional designs)

STARD [guidelines](#) for studies of diagnostic accuracy.

Manuscripts should follow the style of the Vancouver agreement detailed in the International Committee of Medical Journal Editors' revised 'Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication', as presented at <http://www.ICMJE.org/>.

Manuscripts should be presented in the following order, where applicable:

(i) abstract and key words, (ii) text, (iii) acknowledgments, (iv) references, (v) supporting information, (vi) figure legends, (vii) tables (each table complete with title and footnotes) and (viii) figures. Footnotes to the text are not allowed and any such material should be incorporated into the text as parenthetical matter.

As all manuscripts are double-blind peer-reviewed, a title page and any acknowledgements should be supplied as separate files.

All articles submitted to the Journal must comply with these instructions. Failure to do so may result in return of the manuscript and possible delay in publication.

Spelling. The Journal uses Australian spelling and authors should therefore follow the latest edition of the Macquarie Dictionary.

Abbreviations. In general, terms should not be abbreviated unless they are used repeatedly and the abbreviation is helpful to the reader. Initially use the word in full, followed by the abbreviation in parentheses. Thereafter use the abbreviation only.

Units. All measurements must be given in SI or SI-derived units. Please go to the Bureau International des Poids et Mesures (BIPM) website at <http://www.bipm.fr> for more information about SI units.

Trade names. Chemical substances should be referred to by the generic name only. Trade names should not be used. Drugs should be referred to by their generic names. If proprietary drugs have been used in the study, refer to these by their generic name, mentioning the proprietary name, and the name and location of the manufacturer, in parentheses.

Parts of the manuscript

Title page

As articles are double-blind reviewed, material that might identify authorship of the paper should be placed on a title page. This needs to be uploaded as a separate word document in the Scholar One manuscript submission process.

Abstract and key words

Research articles, Brief reports and Reviews. Abstracts should be 150 words or less and structured into sections preferably under the headings: Objective(s), Method, Results, Conclusion(s). Policy and Practice updates and Innovations in Aged Care. Should be preceded by a short structured abstract of 150 words or less, using the headings: Objective(s), Method, Results, Conclusion(s), where relevant. Other articles. Editorials and Invited Commentaries do not need an abstract.

Five key words, for the purposes of indexing, should be supplied below the abstract, in alphabetical order, and should be taken from those recommended by the US National Library of Medicine's Medical Subject Headings (MeSH) browser list at <http://www.nlm.nih.gov/mesh/meshhome.html>.

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Tables should be self-contained and complement, but not duplicate, information contained in the text. Number tables consecutively in the text in Arabic numerals. Type tables on a separate page with the legend above. Legends should be concise but comprehensive – the

table, legend and footnotes must be understandable without reference to the text. Vertical lines should not be used to separate columns. Column headings should be brief, with units of measurement in parentheses; all abbreviations must be defined in footnotes. Footnote symbols: †, ‡, §, ¶, should be used (in that order) and *, **, *** should be reserved for P-values. Statistical measures such as SD or SEM should be identified in the headings.

Figures

All illustrations (line drawings and photographs) are classified as figures. Figures should be cited in consecutive order in the text. Each figure should be supplied as a separate file, with the figure number incorporated in the file name. For submission, low-resolution figures saved as .jpg or .bmp files should be uploaded, for ease of transmission during the review process. Upon acceptance of the article, high-resolution figures (at least 300 d.p.i.) saved as .eps or .tif files should be uploaded. More information about figures is available on Author Services at: <http://authorservices.wiley.com/bauthor/digill.asp>.

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Acknowledgements

The source of financial grants and other funding must be acknowledged, including a frank declaration of the authors' industrial links and affiliations. The contribution of colleagues or institutions should also be acknowledged. Personal thanks and thanks to anonymous reviewers are not appropriate.

References

The Vancouver system of referencing should be used (examples are given below). In the text, references should be cited using Arabic numerals in square brackets (eg: [1] etc) in the order in which they appear. If cited in tables or figure legends, number according to the first identification of the table or figure in the text. Authors are responsible for the accuracy of the references.

In the reference list, cite the names of all authors when there are six or fewer; when seven or more, list the first three followed by et al. Do not use ibid. or op cit. Reference to unpublished data and personal communications should not appear in the list but should be cited in the text only (e.g. Smith A, 2000, unpublished data). All citations mentioned in the text, tables or figures must be listed in the reference list. Names of journals should be abbreviated in the style used in Index Medicus.

We recommend the use of a tool such as Reference Manager for reference management and formatting. Reference Manager reference styles can be searched for here:

<http://www.refman.com/support/rmstyles.asp>.

Journal article

1. Soter NA, Wasserman SI, Austen KF. Cold urticaria: Release into the circulation of histamine and eosinophil chemotactic factor of anaphylaxis during cold challenge. *The New England Journal of Medicine* 1976; 294: 687–690.

Book

2. Kaufmann HE, Baron BA, McDonald MB, Wlatman SR (eds). *The Cornea*, 2nd edn. New York: Churchill Livingstone, 1998.

Chapter in a Book

3. McEwen WK, Goodner IK. Secretion of tears and blinking. In: Davidson H (ed). *The Eye*, Vol 3, 2nd edn. New York: Academic Press, 1969; 34–78.

Electronic Material

4. Mental Health Council of Australia. *Not for Service: Experiences of Injustice and Despair in Mental Health Care in Australia*. [Cited 1 July 2012.] Available from URL:

[http://www.mhca.org.au/index.php/component/rsfiles/download?path=Publications/Not For Service _Full Report.pdf&Itemid=539](http://www.mhca.org.au/index.php/component/rsfiles/download?path=Publications/Not%20For%20Service_Full%20Report.pdf&Itemid=539).

Appendices

These should be placed at the end of the paper, numbered in Roman numerals and referred to in the text. If written by a person other than the author of the main text, the writer's name should be included below the title.

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Manuscripts must contain a statement to the effect that all human studies have been reviewed by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in an appropriate version of the 2000 Declaration of Helsinki as well as the Declaration of Istanbul 2008. It should also be stated clearly in the text that all persons gave their informed consent prior to their inclusion in the study. Details that might disclose the identity of the subjects under the study should be omitted.

Reports of animal experiments must state that the 'Principles of Laboratory animal care' NIH publication Vol 25, No. 28 revised 1996; <http://grants.nih.gov/grants/guide/notice-files/not96-208.html>) were followed, as well as specific national laws (e.g. the current version of the German Law on the Protection of Animals) where applicable.

Clinical trial registration

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