Facilitating Meaningful Activities and Relationships: Designing Dwellings and Communities that Improve the Quality of Life of the High-Needs Elderly

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Abstract
As the population ages, there are greater demands for housing and communities that support independent living for the high-needs elderly. This research qualitatively examines the meaningful activities and relationships of 30 residents requiring assistance in senior housing complexes in New Zealand. Using semi-structured interviews and direct observation, data was gathered on both the perceptions and spatial use of those activities which are significant contributors to quality of life (QoL) and are also greatly influenced by the design of living environments. Emergent themes for meaningful activities and relationships included a desire for: a variety of activities motivated by familiarity; keeping active/able; privacy; maintaining relationships with family friends, other residents and staff; and a connection with, and contribution to, the wider community and nature. Factors such as safety, support availability, connection and privacy, as well as the influence of impairments and personal preferences have relevance for design. The research finds that the design of personal dwellings has a significant impact on the ability of the high needs elderly to maintain their QoL. In the design of individual dwellings, spatial solutions are required to provide greater control for personal activities as well as increased flexibility for social activities within limited interior spaces. As a decline in mobility is commonplace for those with high needs, greater attention is needed to resident walkability. Improvements in QoL can be achieved both through a reorganisation of the home and through bridging the home with the wider community and in doing so, facilitating meaningful activities and relationships.

Keywords: Quality of life, High-needs elderly, Design of housing and community, Activities and relationships

Introduction

The aging population is increasing rapidly in New Zealand, similarly to many other developed countries. In particular, the elderly with high-care needs are projected to increase at a higher rate (Te Pou - The National Centre of Mental Health Research, 2011). As people age, the propensity for diseases and impairments increases (Statistics New Zealand, 2014), and they have greater difficulties in conducting daily activities (Davey, Joux, Nana, & Arcus, 2004; Jaye et al., 2015). At some point, typically in their 70s, these difficulties prompt them to seek more suitable housing, which provides them with greater control and support (Statistics New Zealand, 2002). Some consider moving closer to their children; but most do not wish to live with family to avoid being a burden (Davey, 2006). Combined with the calls for 'ageing in place' which is promoted by the New Zealand government (Ministry of Social Development, 2001), there is increasing demand for housing and communities that enable those elderly with high-care needs to live independently.

Currently, in New Zealand, there are three main housing types which provide some levels of care and support; retirement villages, public-sector housing[1] and private-sector rental housing[2]. Retirement villages, offering company and security as well as home maintenance, are viable options for current homeowners and the relatively well-off (Greenbrook, 2005). Rental housing for the elderly provided by the public sector, community providers and religious and charitable groups are generally affordable; however, most providers do not provide high levels of support and care for older people (Kuboshima, McIntosh, & Thomas, 2017). The demand for retirement villages has been projected to increase by 2.5 times (JLL, 2017); and the levels of homeownership among retired people are falling, which increases the demand for rental housing (Alan Johnson, Philippa Howden-Chapman, & Shamubeel Eaqub, 2018). Government initiatives are seeking to address this situation, encouraging community housing sectors to grow (New Zealand Government, 2015).

Major themes for quality of life (QoL) of the elderly with high-care needs include; independence, activities, relationships, privacy and quality of care, which are prone to be reduced as impairments increase (Hale, Barrett, & Gauld, 2010; Murphy, Shea, & Cooney, 2007; Tester, Hubbard, Downs, MacDonald, & Muephy, 2004). There is also an increasing understanding that meaningful activities and relationships of the elderly are a highly significant contributor to their QoL (Eakman, Carlson, & Clark, 2010; Kiata-Holland, 2010; Wahrendorf & Siegrist, 2010; Wright-St Clair et al., 2012). In order to provide greater QoL, the built environment should accommodate their meaningful activities and relationships, while meeting their changing requirements as levels of impairments increase.

Methods

A qualitative study was conducted of the elderly who needed assistance in daily life and were living in 13 housing complexes designed for the elderly such as retirement villages as well as public/private-sector rental housing in New Zealand. Through documentation of the housing environment, semi-structured interviews and

[1] Includes central government housing (Housing New Zealand) and local-authority housing.
[2] Includes community providers and religious and charitable groups.

observation of 30 elderly residents, data were gathered on both the perceptions and the spatial usage during the day-time and their perceptions. Resident participants were selected using a questionnaire which identified their eligibility for the inclusion criteria of; receiving personal care; and 70 years old or older. Ethics approval was obtained from the Human Ethics Committee of Victoria University of Wellington.

Those data relating to activities and relationships which are significant contributors to QoL and are also greatly influenced by the design of living environments are the focus of this paper. First, the resident attributes and characteristics of the settings were summarized. Next, through the analysis of interview transcripts/notes and observation notes, emergent themes for the resident QoL were coded.

Attributes of participants and features of physical environments

Participants' attributes such as age, gender, living arrangements and marital status as well as impairments and mobility aids used are summarised in Table 1 and 2.

Table 1: Age, gender, living arrangements and marital status

Gender	Age group		Ethnicity		Living arrangements		Marital Status	
Male (n=13)	70-79	3	European/NZ	12	Alone	10	Widowed	7
	80-89	8	Middle Eastern	1	With spouse	3	Married	4
	90-99	2					Divorced	2
							Unmarried	0
Female (n=17)	70-79	3	European/NZ	16	Alone	17	Widowed	14
	80-89	11	Asian	1	With spouse	0	Married	0
	90-99	3					Divorced	1
							Unmarried	2

Table 2: Type of conditions/impairments stated and type of mobility aids

Type of conditions/impairments stated		Type of main mobility aids			
		Indoors		Outdoors	
Had stroke(s)	5	No aid	10	No aids	5
Parkinson's	2	Walking stick	2	Walking stick	5
Other neurological conditions	2	Walker frame/ trolley	14	Walker frame	13
Musculoskeletal conditions	1	Wheelchair	2	Wheelchair	4
Cardiac conditions	8			Mobility scooter	2
Pulmonary conditions	3			Bicycle	1
Diabetes, high blood pressure	8				
Urinary, Bowel conditions	4				
Spinal conditions	2				
Injured by fall(s) recently	4				
Other pain, arthritis	15				
Sight impairments	4				
Other	9				
No specific conditions	2				

Housing complexes studied included five public-sector rental housing complexes for the elderly, three private-sector housing complexes for the elderly and five retirement villages. All retirement villages had independent living units, and two contained

supported living units in addition. The information on the complexes as well as the units studied is summarised in
Tables 3 and 4.

Table 3: Type and size of housing complexes

Housing type	Unit size	Number
Public-sector rental housing (n=5)	10-39	3
	40-69	1
	70-99	1
Private-sector rental housing (n=3)	10-39	2
	40-69	1
Retirement village, independent living units (n=5)	10-39	1
	40-69	2
	100-149	1
	150-199	1
Retirement village, supported living units (n=2)	10-39	2

Table 4: Type of units and the unit floor area

	Unit type		Building type		Unit Floor Area	
Public-sector rental housing units (n=6)	Bedsit A[3]	2	Detached	0	30-	0
	Bedsit B	1	Semi-detached	3	30-50	6
	One-B	3	Apartment (Outdoor access)	3	50-70	0
	Two-B	0	Apartment (Indoor access)	0	70-90	0
	Two-B + Garage	0			90-110	0
	Two-B + Office + Garage	0			110-130	0
					130+	0
Private-sector rental housing units (n=7)	Bedsit A	0	Detached	0	30-	2
	Bedsit B	2	Semi-detached	3	30-50	3
	One-B	5	Apartment (Outdoor access)	2	50-70	2
	Two-B	0	Apartment (Indoor access)	2	70-90	0
	Two-B + Garage	0			90-110	0
	Two-B + Office + Garage	0			110-130	0
					130+	0
Retirement village, independent living units (n=11)	Bedsit A	0	Detached	2	30-	0
	Bedsit B	0	Semi-detached	7	30-50	0
	One-B	1	Apartment (Outdoor access)	0	50-70	1
	Two-B	1	Apartment (Indoor access)	2	70-90	1
	Two-B + Garage	6			90-110	5
	Two-B + Office + Garage	3			110-130	3
					130+	1
Retirement village, supported living units (n=6)	Bedsit A	0	Detached	0	30-	0
	Bedsit B	0	Semi-detached	0	30-50	4
	One-B	6	Apartment (Outdoor access)	0	50-70	2
	Two-B	0	Apartment (Indoor access)	6	70-90	0
	Two-B + Garage	0			90-110	0
	Two-B + Office + Garage	0			110-130	0
					130+	0

[3] Bedsit units are divided into two types of; the bed area and the lounge being separated by the curtain (A) and otherwise (B).

Findings: meaningful activities and relationships that relate to design

Themes for meaningful activities and relationships emerging from the analysis include; four themes for activities of 'Familiarity:' 'Staying active and able,' 'Engagement in personal activities in private space' and 'Contribution'; and five themes for relationships: 'Having guests in their home,' 'Connection to other residents,' 'Connection to the on-site staff,' 'Connection to the wider community' and 'Connection to nature.'

Theme for Activities 1: Familiarity

Religious activities were important for some residents and they appreciated the ease of access to chapels when provided on site in complexes affiliated to religious groups (PR1[4], PR3). Some retirement villages offered communion or Bible study in a communal lounge. However, a man living in public-sector housing who didn't have enough mobility to go to church prayed at home (PU6).

Crafts and needlework such as knitting, patchwork and embroidery were familiar activities for many participants (13 females and one male), though some had given it up. One woman had a special table for bobbin lace in her apartment lounge, but was conscious of untidiness; '*I go and have a look and say oh I have extra bits here* (RVS5).' Artwork was also an important activity (PR1, PR2). This activity could have been better facilitated '*if there was a room where we could leave our materials and I wouldn't worry …if I got pastel dust on the floor cause it's very hard to clean up* (PR1).' Ideally, a separate room or larger lounge could be used for the activity.

Gardens of various sizes and types suiting mobility levels were desired. Some enjoyed growing vegetables and fruits on several sections (PU3, PU4), whereas others, who couldn't manage garden beds, enjoyed gardening with pots, that didn't require much maintenance (4 participants). A resident liked to '*fill all their space with pots* [in the porch, along the fence] (RVS3).' The difficulties in gardening included tasks and postures such as kneeling for digging soil, weeding (PU4, RVS3) and just watering the pots (PR1). Storage for gardening tools was desired in an appropriate space (PU2).

Theme for Activities 2: Staying active and able

Many high-needs elderly people had a desire to maintain or improve their mobility. Walking was particularly an important activity for one-third of the respondents. One respondent explained his motivation; '*it keeps me moving. I don't want to become like some people, they spend too much time indoors and they don't get enough exercise* (PU4)' The ability to walk differed by individual impairments. Some people needed to take a rest during a walk because of pain in legs/knees and breathlessness. A woman, who liked to walk regularly, had difficulties in walking a distance of 80 m: '*I would be sitting down halfway, I'm sure. … I can't, you know, I get too sore, and I have to stop, to let the pain go.* (RVI9)' Another woman, who felt it difficult to walk to the communal space at 22 m distance, said; '*My heart is not good at the moment, so*

[4] Participant identifiers are used in this paper, which consist of PR, PU, RVI or RVS + number.

when I walk, I get breathless. (RVI7)' One man had two walking routes of different distances (410m and 640m), which he could choose depending on his condition (PU4).

Walking in the town entertained one participant, who passed many of his familiar venues such as shops and cafes on the way. He talked about his memories relating to each place (PR7) (Figure 1). Other features that motivated walking included; warm and dry weather (PR7, RVI2), sunny walkways (PR7), well-maintained gardens (RVS4) and having company (RVI1, RVS4).

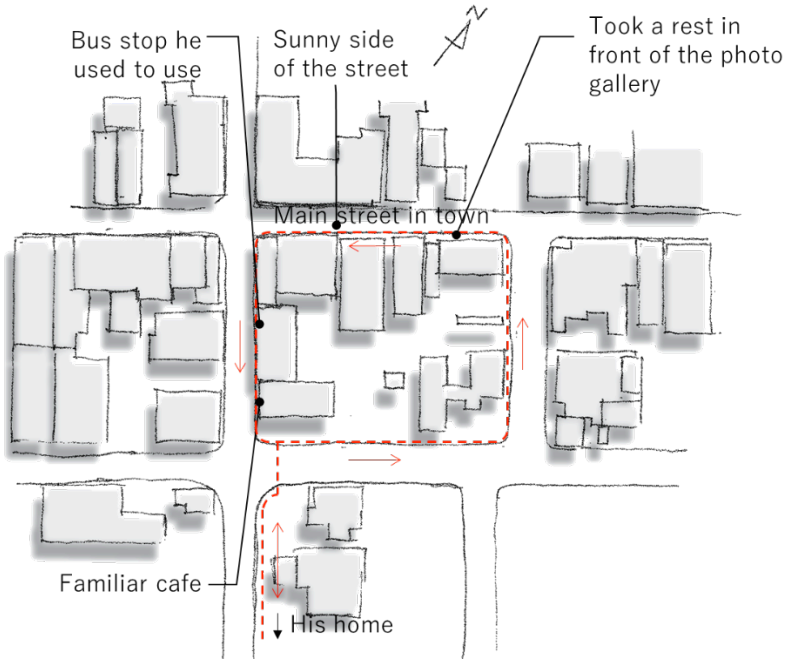

Figure 1: Walking route of a resident in the town

Some complexes were poorly designed in terms of walkability. Residents of a big complex with villas crowdedly lined up walked to the gate of the village and then return to their house. A resident expressed frustration, '*If you want to go for a walk, you do the same route all the time really* (RVS4).' Car safety was a concern in large complexes with a long roadway. '*You get the occasional persons who don't take any notice of the speed limit and they speed through the place.... So you have to be more careful than you used to be crossing the road*. (RVI1)' Those with difficulties to do with vision had special requirements. In general, walking in darkness was not preferred (RVI10). One resident preferred to walk on the road rather than on the footpath, because '*it gives me more space to walk* (RVI11).' A speedbump on the road was a hazard for him; '*... I forgot the hump in the road, you know? And I tripped over that hump, and I fell.*'

Theme for Activities 3: Engagement in personal activities in private space

All respondents used certain types of chairs to spend most of their time in an easy posture. Only one person stayed mostly in the bed. An armchair was the most common type, which was often adjustable in the leg and back position.

Watching TV was the most common activity. Most watched TV from their chair, and a few from bed (PU4, PR5). Sitting spaces were laid out with respect to the location/direction of the TV, except for one person who didn't like watching TV

(RVI8). Those who had issues with eyesight prefer to sit with their backs to the windows (PR4, RV7), because; '*I don't think I could cope with that [the opposite layout]. Because you're looking into the light all the time.* (PR4) (Figure 2)*'*

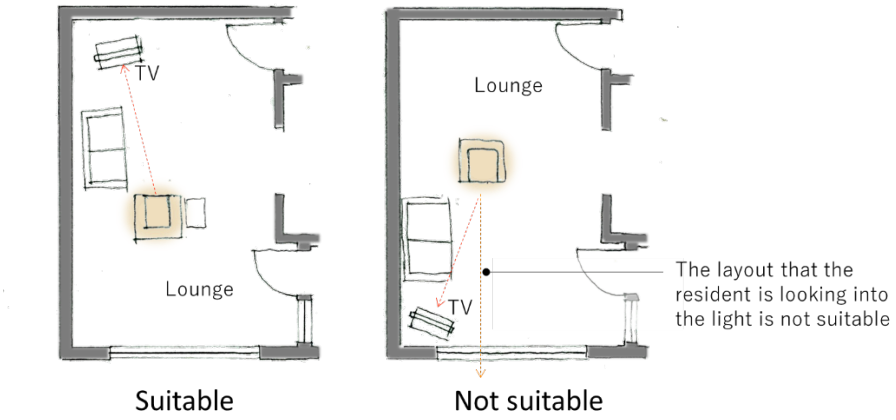

Figure 2: Layout of the chair and TV for a person with vision impairment

Other important activities included; reading books and newspapers (3 participants); writing letters/postcards and diaries (6 participants); playing computer games (3 participants); and listening to music, radio and audio books (6 participants). Benefits of personal computer (PC) games included that '*it keeps me occupied, you know; it keeps your brain ticking over.* (PU3),' and those of listening to music included that '*It passes time quickly, and it helps get you relaxed, and feel all right* (RVI11).' Various tools for activities[5] and furniture and fixtures to accommodate them were placed within reach of their sitting space. Particularly, level surfaces such as shelves or cupboards with multiple drawers were useful for keeping things tidy (PU3, PR1). Residents who didn't have enough level surfaces filled things on adjacent table/desk and put things on the floor (3 participants). Some activities required separate space with special furniture, such as a writing table and a PC desk. Particularly, a table was important for a resident with hemiplegia, that supported his arm during activities (PU1).

Many people liked seeing outside, particularly moving people and cars, which was often the main reason for choosing their sitting space. One resident said; '*you can see out and see what's going on ... Reminds me I'm still alive* (RVI2).' An elderly couple had different preferences from each other regarding looking outside, and arranged their armchairs differently (RVI3) (Figure 3).

[5] Tools for activities include; remote controls and a TV guide for watching TV, books, newspapers eye glasses, a magnifier, a letter opener, a lamp for reading; pens, letters, post cards, a diary and a computer for writing; a computer and a tablet for playing PC games; and CDs and a CD player for listening to music.

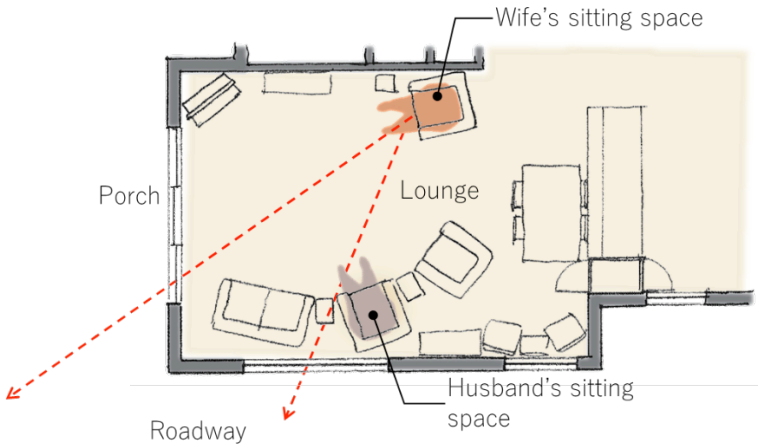

Figure 3: Difference in the sitting position depending on the preference for seeing outside

Some residents engaged in multiple activities and tasks. One man said; '*I can do two things at once. The ear's that way [to the TV] but mostly the eyes are looking this way [to the laptop]*. (PU3)' He also liked horse racing, which required tasks of; watching TV, taking notes on a paper, and placing bets through the computer which rested on the armrest of his armchair (Figure 4).

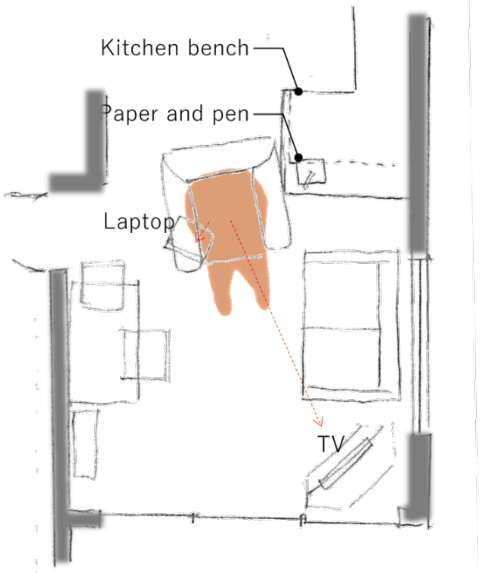

Figure 4: Sitting space that facilitated engagement in multiple activities

Theme for Activities 4: Contribution

Many respondents had been involved with volunteer works related to their occupation/skills, religion and other interests, such as; teaching (PR1), needlework (PR1, RVS2), playing a musical instrument (RVI8), building and machinery skills (PU3, PU4), helping church and other organisations (3 residents). While health conditions prevented continuing this work, some carried on contributing just scaling down the activities. For example, one woman, who used to teach needlework, assisted other women in her personal group (RV5). Another woman wished to contribute by her patchwork; '*if I could finish it, I'll give it to the Wellington Free Ambulance to raffle or to sell or whatever they wanted to do*. (RVS2)' Communal

space was often the venue where voluntary activities occurred. One resident helped library services (RVS5), others helped in setting the tables out for dinner (RVS6) or serving meals to everyone (PR7) in their communal dining rooms.

Theme for Relationships 1: Having guests in their home

The family connection was the most important aspect of relationships. Many residents had visits once a week or more. Family/friends visits were appreciated for physical/mental support. When having guests in their home, being able to *'see who is coming* (PU1, PU3)*'* before their arrival was important to control and welcome the visitors. Unfortunately, residents of apartment-type accommodations typically did not have views to guests approaching (6 participants). An apartment-resident who could not see the door from her sitting space said; '*I can't go to the door easily, so I just wait. The door is unlocked.* (RVI7) (Figure 5)' When residents called out '*Come in!'* while seated, the sound of their voice could not always be heard by guests outside of the door because of the distance or blockages by walls (PU5, RVI7).

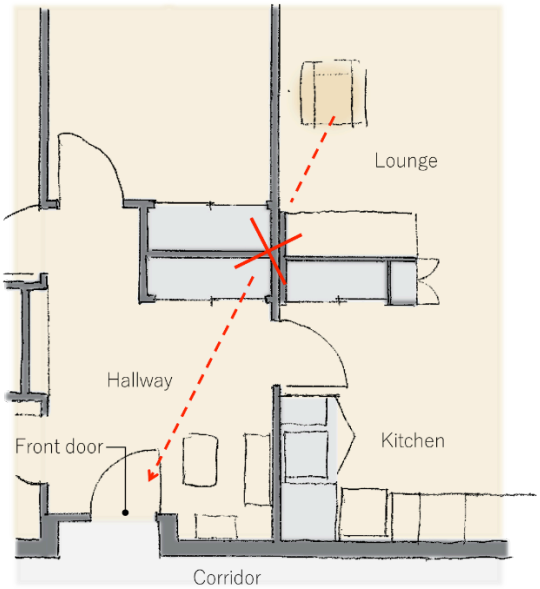

Figure 5: Interior layout that hinders the view from the sitting space to the door

Having a lounge separate from the bedroom was preferred for greater privacy when entertaining guests (9 participants). One woman who enjoyed socialising did not have many guests because her bedsit room was '*more like a bedroom*. (PU5)' Another bedsit resident wanted a hard separation rather than their curtain (PU1).

Some participants had a large number of guests at a time in their own house, such as extended family (PR6) or personal hobby/religious groups (3 participants). A one-bedroom apartment (approx. 50m^2) was too small to accommodate a group of ten people; '*that is very crushed* (RVS5).' Extra chairs were put in the lounge as well as the bedroom, but the resident felt it '*untidy* (RVS5).' Common indoor/outdoor space could be used to accommodate guests and extra chairs. One woman held several soirées using the open lawn space leading out from her lounge (PU2) (Figure 6). An apartment resident used communal indoor space near their unit for potluck get-togethers (RVS4).'

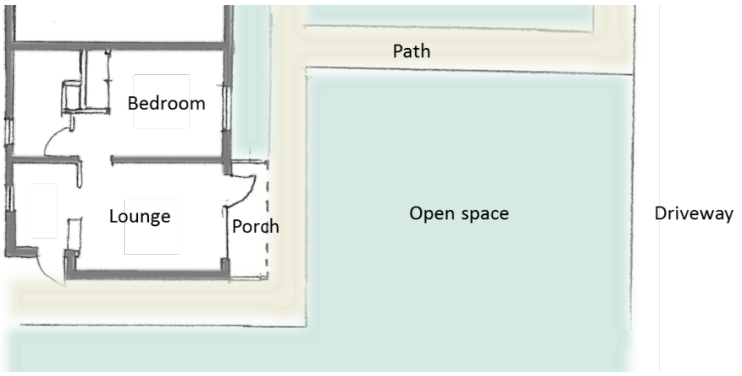

Figure 6: Open space in front of the unit, which was used for hosting large number of guests

Most residents who had more than one bedroom used the second bedroom for overnight guests (8/10 participants), which was important. The spare room was used frequently (once a month or more) (RVI1, RVI4), and/or for a long period such as several weeks (RVI1, RVI7). The garage was also used to accommodate guests (RVI9, RVI11). One woman parked her car out of the garage so that it could be used as a bedroom for two grandchildren, however, '*it's not insulated, so it's OK in summer but not in winter* (RVI9).' Another resident who didn't have a car furnished their garage (RVI11) (Figure 7). In contrast, there were no bedsit residents who had guests stay overnight. One-bedroom units could accommodate one or two family members or intimate friends in the bedroom (RVS4) or in the lounge (PR4, RVS6), by using an extra bed stored beside/under their bed or using a sofa bed. One woman wanted a second bedroom for her visiting son, who '*used to stay here in his cushions ... on the floor* (RVS1).'

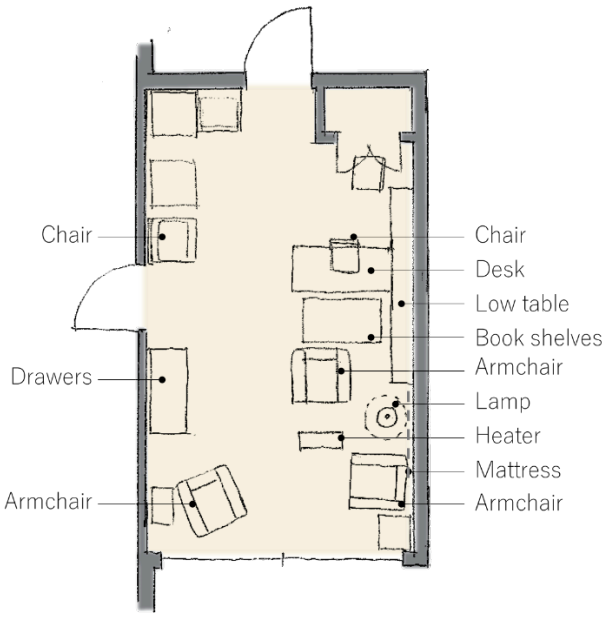

Figure 7: Layout of furniture in the garage to accommodate guests

Respondents particularly enjoyed having grandchildren/great-grandchildren visit. However, special attention was needed for children's spatial usage, because '*all these kids go mad, running around all over the place.*' The resident's space was separated and shut off from children's space, because *'they're very inquisitive* (RVI1).' There

were different views on children. While some people liked to see children (3 participants), children's noise was not preferred by some (PU4).' A man with limited eyesight had to '*be very careful that I don't run into them [little children],'* who were '*running and scampering along* (RVI11).'

Theme for Relationships 2: Relationships to other residents

Connection to other residents was important for many participants, which contributed to a greater sense of safety. Some residents supported each other when needed or through regular visits (PU2, PR5). Encounters among residents often occurred near the unit entrance, such as in a corridor or in the porch. The view and proximity from the lounge to outside encouraged resident interaction; for example, a man, who was sitting in his lounge, found the neighbour pass in front of his unit and talked to him in the porch (PU4) (Figure 8 left).

In serviced apartments, a common lounge was used frequently by some residents. *This was a place to relax. We were close, because we felt "This is our room."* (RV3)' She used the space frequently (10-12 times a month), sitting in the same chair. The other two armchairs also had dedicated occupants (Figure 8 right).

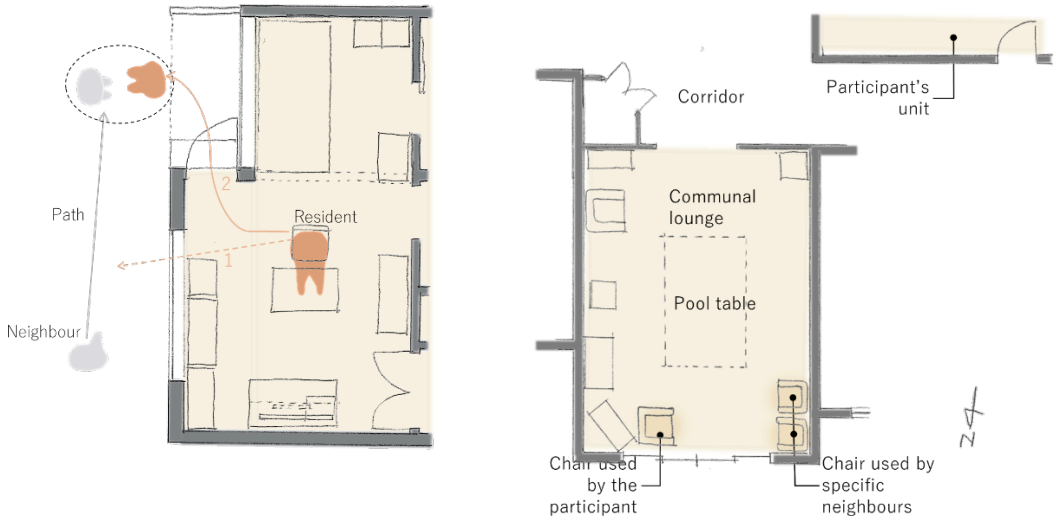

Figure 8: Spatial organisation that encouraged resident interaction (left) and frequent use of communal space by residents (right)

While appreciating the connection, most residents valued maintaining privacy from other residents, saying; '*We're not living in each other's pocket* (3 participants).' However, the unit layout with windows facing each other, particularly in close proximity, affected their privacy (3participants). One apartment resident, who had a view to a window of the neighbouring unit in close proximity, talked about the concern; '*... I don't know if they really could or not but I thought, and then I used to close the [bedroom] door almost* (PR1) (Figure 9 left).' A woman praised the unit layout, that was well considered for resident privacy, with the angle of and distance between houses (RVI9) (Figure 9 right).

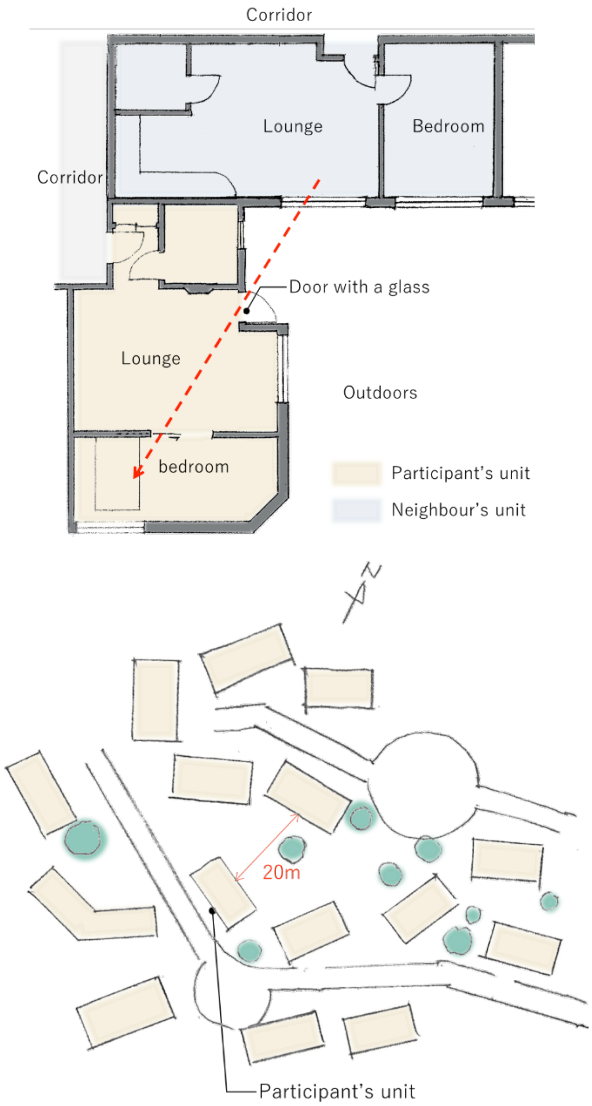

Figure 9: Unit layout affecting privacy (left) and that with consideration in the distance and angles (right)

A level difference was effective for maintaining privacy. A man who lived in a first-floor apartment said; '*I have stood down there and looked up here to see what people could see. You can see that heater. You cannot see the settee…. So providing I'm not standing up against the window, I could stand here and nobody would see me* (RVS6) (Figure 10 left).

The unit layout also had an impact on their sense of connection. One female resident, who had a kitchen window which was facing to her neighbour's window at a 6m distance, said; '*It's not close enough to worry me. I quite like having neighbours because it's a bit of company around, isn't it? … If my neighbours on my side don't see my blinds go up in the kitchen, they know there's something wrong. That works both ways, of course, I can see them.* (RVI2) (Figure 10 right)'

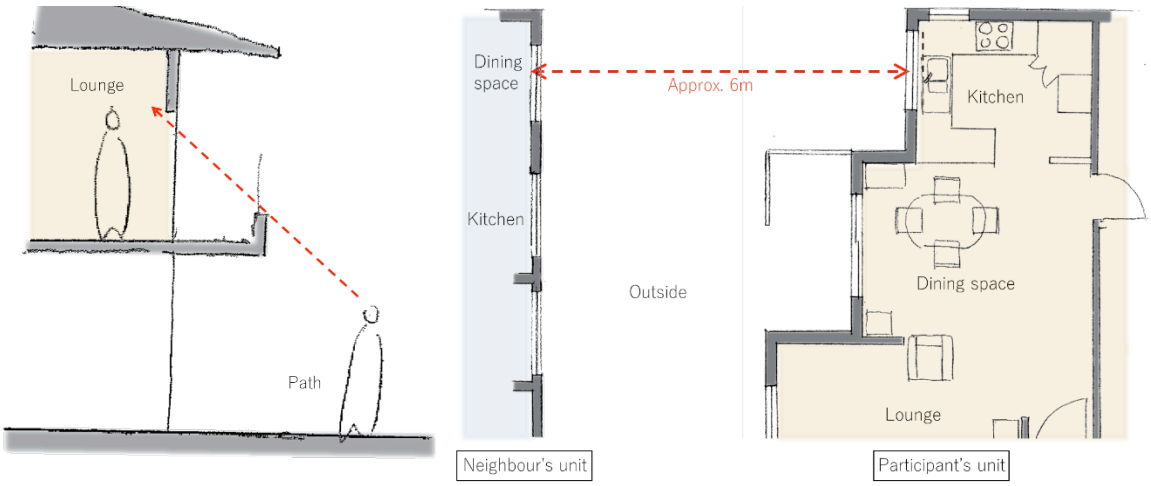

Figure 10: Level difference as a design solution for privacy (left) and the layout of units and windows that contribute to greater sense of connection while maintaining privacy (right)

Theme for Relationships 3: Relationships to the on-site staff

The presence of the on-site staff provided residents with a greater sense of safety. In serviced apartments, the on-site medical/care staff near resident units provided greater support and care. A resident of a serviced apartment appreciated their greater and more flexible manner of care provision, comparing to a situation before; '*when I was over in the villa by myself it wasn't possible for me to live by myself because of things I can't do. ... That's why I'm here but when I need care I get it and I can get full care. ...They'll just see whatever I need…. I just want to have as much independence as much as I can.* (RVS5)'

While support from the staff was generally appreciated, the manner of the staff visits affected their privacy. In particular, a loss of privacy was experienced by residents in serviced apartments, where many residents received frequent staff visits. It was acknowledged that the staff waiting for the resident reply after ringing the doorbell or knocking before opening the door provides greater privacy for residents (RVS4); however, during the observation, no staff member waited for the resident's reply before opening the door, some even entering without a knock (RVS1). In case where a resident had a hearing impairment, a knock would not notify him of the staff arrival, particularly when not wearing hearing aids (RVS6). The front door was also problematic in some cases. The hinged door didn't shut properly with a light push of a staff member, so the door was kept half-open (RVS3, RVS4).

Theme for Relationships 4: Connection to the wider community

Many participants left their complexes for personal activities and relationships. Many lived in complexes in their former neighbourhoods and half of the participants expressed an attachment to place. Common activities outside of the complex included going to the café (12 participants), to the church (8 participants), to the club (4 participants), to the public library (PR2, RVI4) and to other social groups (PU5, PR5). One resident chose to go to the club in the town instead of a gathering held in his own complex, because; '*I've got a lot of friends who go to the club ... Still stick together, and… it's a just a change from here*. (PR7)'

While a few residents walked to the town (3 residents), most used a car (13 drove) and others used other vehicles such as a mobility scooter (PU1, RVI8), an electronic wheelchair (RVS5), an electric scooter (PU4), and a bicycle (PU3). The car access

between the gate and the unit was an issue in those cases where the complex was large. One resident complained about the confusing street system with '*so many one-way streets,'* which he found *'to try to direct someone through this to find this place is very difficult*. (RVI3)' Storage for vehicles and access from their unit was important. A man, who had difficulties in walking over the threshold with a small level difference at his exterior door, stored his scooter indoors, which took up large space in his bedsit (PU1). The electric wheelchair or scooter also required a storage with a power outlet to charge with (PU4, RVS5).

While the proximity to the supermarket and other facilities in town was appreciated by many residents, 'peace and quiet' and safety was important for others. A man talked about the greater safety of his complex compared to his previous house, where he '*had a burglar* (RVI4).' The enclosure of the site and the locking gate or the common entrance increased the sense of safety (3 participants). One resident complained about the public access through the site; '*we have actually had sometimes kids come through and they've been on the boisterous side at night – about 10 o'clock, 11 o'clock at night* (PU4).'

Theme for Relationships 5: Connection to nature

Views to nature were generally preferred by participants. Many liked views of the mountains, hills and bushes (10 participants), and some seas (PR4, PR5). The reasons for the preference related to their previous houses (RVS4, PR4) and past activities (PR2, RVI2). One woman had multi-level views. She could see the spacious green area in front of her unit, watch people moving on the road and see the country views and the mountains at a distance (Figure 11), which she loved (RVI10).

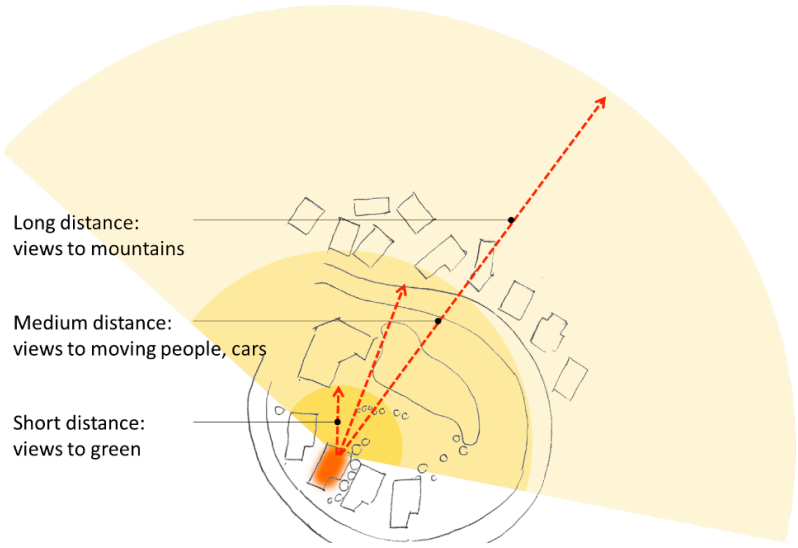

Figure 11: Multi-level views from a resident unit

Some residents mentioned they liked to see trees, shrubs and/or birds from their sitting space (4 participants). Tuis and wood pigeons, kowhai and flax were the preferred flora and fauna (4 participants). One resident talked about the importance of trees, particularly in a confined situation; '*There is a building just over the fence, and if there were not trees, I wouldn't like it*. (RVI6)' However, trees caused other residents distress, such as limitations in the view and the access to the sun (PU6,

RVS5). A resident complained about tall trees blocking access to the sun and suggested; '*smaller trees, bushes, they're more suited for this site* (PU4).' Some people fed birds on their porch or a common deck (3 participants). A woman said; '*as soon as I open my curtains, they're all sitting on the fence waiting for their breakfast* (RVS2).'

Discussions: Design considerations

Design considerations were distilled through the analysis for the QoL in regard to activities and relationships of high-needs elderly, which were categorised into three large categories of 'Personal dwellings,' 'Transitional spaces between inside and outside,' and 'Community design' (Figure 12).

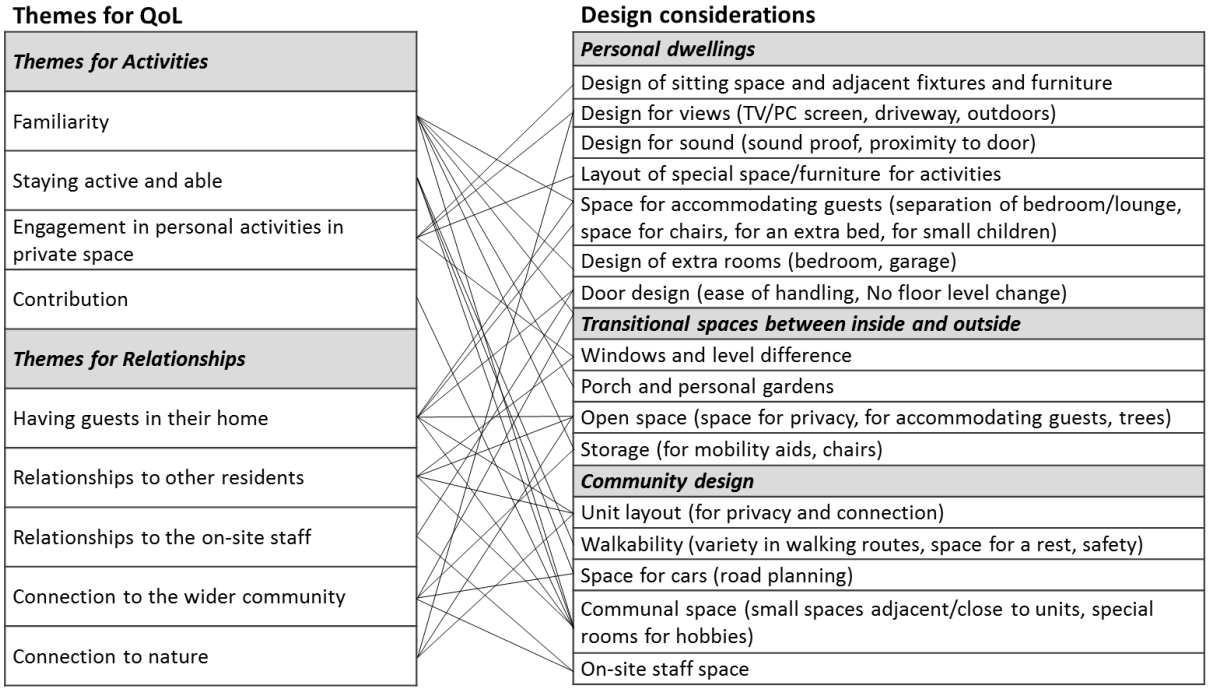

Figure 12: Themes for QoL in regard to meaningful activities and relationships, and the distilled design considerations of dwellings and communities

Those elderly residents who had limited mobility spent a long time in their dwelling, and enjoyed indoor personal activities. In the design of personal dwellings, there should be careful consideration of the environment surrounding their sitting space for greater control of activities as well as providing optimal visual and sound environments. Given that having guests is valuable activities for many, there should be consideration of space that can accommodate guests and the extra furniture needed for it.

Consideration of the space to accommodate guests can be extended to the use of common area. The space leading out from the dwelling has great potential to accommodate activities, people and possessions that cannot be accommodated inside; particularly, there should be storage for mobility aids. In the design of the complex, there should be consideration in the unit layout for providing both privacy and connection among residents. While the connection to the wider community is important for elderly participants in terms of activities, relationships and familiarity, it

is not always accessible or safe enough for them. To provide greater QoL for residents, the close community can play a significant role in facilitating activities and relationships. In particular, attention should be paid to the design for greater walkability to accommodate their desire for keeping fit.

Conclusion

As the population ages, there is increasing demand for housing and communities that can accommodate the elderly with high-care needs while maintaining their QoL. This paper has clarified themes for their meaningful activities and relationships that included a desire for: a variety of activities motivated by familiarity; keeping active/able; engagement in personal activities in private dwellings; having guests (family and friends), maintaining comfortable relationships with other residents and staff; and a connection with, and contribution to, the wider community and nature. In the design, factors such as safety, support availability, connection and privacy, as well as the influence of impairments and personal preferences should be taken into account. The research finds that the design of personal dwellings has a significant impact on the ability of the high needs elderly to maintain their QoL. In the design of individual dwellings, spatial solutions are required to provide greater control for personal activities as well as increased flexibility for social activities within limited interior spaces. As a decline in mobility is commonplace for those with high needs, greater attention is needed to resident walkability. Improvements in QoL can be achieved both through a reorganisation of the home and through bridging the home with the wider community and in doing so, facilitating meaningful activities and relationships.

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