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Implications for the Design of Rental Housing for the Elderly that Improves their Quality of Life

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Abstract: As the population ages, the demand for suitable rental housing will increase. Suitable housing means housing that can accommodate those impairments that typically correspond with ageing. This paper explores the quality of life (QoL) requirements of the elderly with high-care needs who live in rental housing. It identifies important design considerations through a qualitative case study of three elderly people who need assistance and are living in local-authority rental housing in New Zealand. The themes of QoL were identified from the literature and related to the larger themes of; 1. Activities and independence, 2. Sense of control, 3. Privacy, 4. Relationships, 5. Quality of care and 6. Other. The survey consisted of a detailed documentation of the physical environment, followed by interviews with and full-day observations of the residents and their caregivers. The study finds that the design of housing that improves their QoL requires solutions to accommodate the various conflicting needs for their QoL which include those derived from the diversity in user's preferences and impairments. In the design of rental housing, there is greater need for additional or reorganized space to accommodate caregivers and visitors; maintain residents' independence, privacy and other aspects important for their QoL.

Keywords: Elderly; quality of life; rental housing; qualitative method.

1. Introduction

As people age, they have greater propensity for impairment and difficulty performing everyday tasks, as well as a higher prevalence of psychological concerns such as insecurity and loneliness (Hale *et al.*, 2010; Jaye *et al.*, 2015). At some point, typically in their 70s or later, these experiences induce them to seek a more suitable dwelling (Statistics New Zealand, 2002). Some consider moving closer to their children; but most New Zealanders prefer to avoid 'being a burden' (Davey, 2006). Along with the projected rapid growth in the older people with high care needs (LiLACS NZ, 2017), there is an increasing need for housing that supports those who require assistance to live independently.

The demand for rental housing in New Zealand is projected to increase rapidly (Matthews and Koh, 2017), and as the levels of homeownership continue to fall (Statistics New Zealand, 2014) the demand for rental housing is considered to rise even faster in the future. Shortages are already reported in rental housing for the elderly in Auckland (Seniorline, 2016). In response, recent government initiatives are

seeking to address this situation, encouraging community housing sectors to grow (New Zealand Government, 2015).

Rental housing tends to be less suitable for those elderly with disabilities, in terms of the provision of care and support, and access and facilities for the disabled when compared with housing in retirement villages (Kuboshima *et al.*, 2017a). However, a high proportion of residents receive personal care in rental housing, yet the current rental housing generally fails to accommodate those with higher levels of dependency (Kuboshima *et al.*, 2017b). There is a growing demand to provide the physical environments that facilitate the high-dependency elderly to live independently in rental housing.

The quality of life (QoL) of dependent older people has been studied by many researchers (Tester et al., 2004; Murphy et al., 2007). Common themes include; independence, activities, relationships, identity and quality of care. Nord, a Swedish researcher focused on privacy and the delivery of care in the assisted living. She found that the changing relationships between space and activity which accompanied assistance often compromised privacy (2011). It has also been suggested that privacy could be at stake in an ordinary home, as caregivers enter the home (Hale *et al.*, 2010). Similarly, a New Zealand study reported a reduced QoL for residents in supported-living units in retirement villages (Hayward, 2012). These examples, examined privacy and QoL in owned dwellings; however, there is limited literature on the experiences of rental housing for the elderly in New Zealand.

This paper explores themes of QoL for the elderly who live in rental housing and require assistance from others to identify the design considerations for rental housing required for the elderly to maintain QoL as they age. This study focuses on housing provided by local authorities in the Wellington region of New Zealand. The features of the typical local-authority housing include; complexes with less than 40 units; the inclusion of adjacent communal facilities; common unit types of bed-sit and one-bedroom units in semi-detached or apartment-styles. Some local authorities provide additional social support for residents, such as organising recreational activities and visiting elderly regularly. However, none provide assistance in household task or personal care, which is provided by external care providers through district health boards.

3. Method

An ethnographic case study was conducted for three elderly who need assistance in daily life and are living in local-authority rental housing in New Zealand. Ethnography is a qualitative method which has a great deal of potential in post-occupancy studies and which has many uses in architecture and built environment (Lucas, 2016). Inclusion criteria were: those who receive personal care; were more than 70 years of age; and were interested in the survey. They were selected through a questionnaire for the elderly which formed part of a previous study of housing options for those with high care needs. The survey consisted of: 1. documentation of the physical environment of the house; 2. semi-structured interviews with the elderly residents and their caregivers; and 3. Personal observation of the residents during a full day including unstructured interviews and informal conversation. Three cases of elderly people with different levels of dependency and living in different types of unit were selected for analysis (Table 10). Transcribed interviews and the observation notes were imported into the qualitative data management software, NVivo. The themes that emerged were coded in relation to broader QoL themes. For each theme, similarities and differences between the three cases and the reasons of them were analysed, and the relevant design themes were identified. Integrating the results, the implications for the design of housing for the elderly that improves their QoL are discussed.

Table 10: Basic information on residents and settings of the selected cases

		Case 1	**Case 2**	**Case 3**
Resident	**Age**	81	73	75
	Gender	Female	Male	Male
	Levels of dependency	High (DS*=7)	High (DS=4)	Low (DS=2)
	Types of impairment	Operations in knees and shoulders. Arthritis in the legs.	Had a stroke, and have left hemiplegia. The right hand shakes. Pain (shoulder, back).	Pancreatitis. Diabetes. Arthritis in the knee. Had hip replacement.
	Required personal care	Bathing, Dressing Personal hygiene Put on/off compression stockings	Bathing Personal hygiene Put on/off compression stockings	Bathing Personal hygiene
Setting	**Unit type**	Bed-sit	Bed-sit (Bed-space and lounge can be separated by a curtain)	One-bedroom
	Suitability for the disabled	Not suitable (Steps in access, Bath-tub)	Not suitable (A gap in the shower)	Not suitable (A gap in the shower)
	Unit size	32m²	35m²	41m²
	Unit plan	BS, B, K	K, B, BS	B, K, BR, L
		L=lounge, BR=bedroom, BS=bed-sit, K=kitchen, B=bathroom		
	Communal room	No	Yes	No

*DS ('Dependency Score'): For each person, six activities (bathing, dressing, personal hygiene, moving indoors, moving from bed to wheelchair/chair and eating) were given the scores of 0-2 or 0-3, according to the degree of assistance they receive. They were given a 'Dependency Score,' the total of six scores for each activity.

4. Themes for QoL

Through analysis, sub-themes were identified and related to the larger themes of; 1. activities and independence, 2. sense of control, 3. privacy, 4. relationships, 5. quality of care and 6. other, which is described in this section. For each sub-theme, similarities and differences for three cases were analysed qualitatively and the relevant design issues for each of the themes for QoL were distilled (Table 11).

4.1. Activities and Independence

Circulation and space for movement

All residents wanted barrier-free environments; for example, the bathtubs, a threshold to the shower stall and the steps for access to the unit could be removed. They had difficulties in moving with their walker frame (1) and experienced pain (3) when going up and down the steps.

Resident 1, who rarely used an aid indoors, needed to hold walls and fixtures to keep their balance while walking. Resident 2, who was dependent on a trolley which provide support with walking, had to be most careful when moving with his tea or soup on it over the threshold between different floor materials, which had less than a centimetre level difference. Resident 3 had no requirements in walking.

For outdoor mobility, Resident 1 had trouble going down three steps with a walker frame to the roadway to get on a taxi. Resident 2 had a difficulty passing through the exterior swing door with a threshold while holding the trolley. He used a mobility scooter, which was stored in his unit, because it had access by using the trolley, as well as space for transferring from the trolley and turning around the vehicle. Resident 3, who used a bicycle, wished for storage space for it under cover, preferably accessible nearby such as in shared storage.

There were differences in the suitability of the physical environment by types/levels of impairment, which relate to requirements for aids/vehicles for moving indoors and outdoors. The differences included; the need to hold walls when walking and the extent to which barrier-free interventions were needed. The corridor and passageway widths should be considered in terms of walls and furniture required to support walking. Barrier free design should be considered in the door design, as well as floor design in both interior and outdoor spaces.

Spaces for sitting and various activities

All participants sat most of the time on an adjustable armchair in their lounge/bed-sit space. This space, while allowing them to rest in their most comfortable posture and to adjust their leg and back position, also facilitated many activities. Activities gave them something to do and the feeling of being occupied which was important for them. Within their reach there were level surfaces such as a table or a kitchen bench or shelves (including those under a kitchen bench and those of a trolley) to accommodate various things such as glasses, phones, remote controls, medicine, cups of tea, mail, pens and papers.

There were also differences in activities in the sitting space, depending on the level/type of impairment; Resident 2 often sat at the table while playing PC games, which required special posture due to his impairment, whereas Resident 3, who could adjust his position, put his PC on the arm of the armchair while playing PC games. While there were common activities for all such as watching TV and reading, other activities varied depending on preferences. For example, Residents 2 and 3 liked operating PCs, and Resident 1 liked knitting and crosswords, for which the space was used differently.

The spatial organization of sitting spaces should allow the layout of an armchair with immediately adjacent tables and shelves to put on things within reach. The design of these spaces should also facilitate residents various activities including watching TV. In particular, space that accommodates a table as well as an armchair, is necessary for high-dependency elderly with limited posture options.

4.2. Sense of Control

Ease of maintenance, keeping space clean and tidy

It was important for residents to keep their spaces clean and tidy to maintain their sense of control. Resident 1 had many shelves at various heights within reach, which were very useful for her. Resident 3, who had shelves near his sitting space, also found that he could keep the space tidy. However Resident 2, did not have enough shelves and who put things on a table in a less organised way, wanted more shelves at an appropriate height. The higher shelves were rarely used by those with higher levels of impairment, because they could only reach the front of the shelf and could not use a step ladder to reach the rear area

of the shelf. Resident 2, whose hands shook, often spilt liquids (tea/soup) and didn't like carpet, which stained easily and was never cleaned even by the home-helper.

Difficulties in keeping the space clean and tidy varied depending on the types/levels of impairment. There should be consideration with regard to interior elevation that provide shelves of appropriate height and depth, in the design of storage spaces. Greater consideration of maintenance and cleaning with respect to floor materials is also required.

Control over visitors

All three participants experienced a sense of control when they knew visitors were coming before they actually arrived. Each had a view of the doorway from their sitting space; however, there were differences in the extent to which the view of the visitors was restricted before they actually arrived depending on the spatial layout. Resident 2 and 3 had lounge spaces facing the front of the dwelling with a view to a long driveway and liked that they could see who was coming. However, Resident 1, whose lounge did not face the front, could only see who was coming through the window next to the front door just before they arrived. To improve the sense of control over visitors, there should be consideration given to the spatial organisation of interior spaces so as to allow residents to see the arrival of visitors from their armchair.

4.3. Privacy

Space for privacy against passers-by

When there was insufficient space between the dwelling unit and pathway, some residents felt a loss of privacy (1) and would shut the curtain (2) because 'people can easily look inside'. This was not a worry of others such as Resident 3 who had no path nearby where many people could pass by. Privacy concerns are particularly important in small dwellings where many people can pass by in close proximity.

High privacy needs for incontinence

Resident 2 had high privacy needs which relates to incontinence. He kept a piddle bottle in the trolley at all times. When the lead researcher was situated near the sitting space for the observation part of the survey, the resident tried to hide and pass water in the kitchen (approx. 3m away); however, he was unable to reach the privacy of the kitchen, passing water near the armchair because he had insufficient time to move. Resident 3 also mentioned his frequent toileting at night (every 2 hours); however, this did not impact on privacy. There should be consideration in the spatial design of spaces for highly dependent people that meet the special needs for privacy related to issues such as incontinence.

4.4. Relationships

Socialising through communal activities

Resident 1 was fond of socializing and maintaining relationships with others; she was engaged in various kinds of social activities such as singing groups and social gatherings in other council housing complexes. She wished for a community room in her own site. In contrast, Resident 2 did not attend any communal activities organized for residents because of his concerns with incontinence. Resident 3, who had no organized activities nor any communal space in the complex where he lived, did not wish for them, because he preferred to keep in touch with other residents more personally. Differences in the manner of socialising with others can be affected by impairment and influence the preferences for socialising.

Space for welcoming visitors

Resident 1 and 2, who had limited mobility, often invited visitors in while remaining seated, calling out a greeting and invitation to 'Come in.' All participants preferred the separation of the lounge from the bedroom. Resident 1, who had only a bed-sit space, wished for a separate lounge in which to entertain guests. Resident 2 wished for a wall rather than a curtain between the sitting space and the bed space for improved privacy through hard separation of spaces. Resident 3 living in a one-bedroom unit liked the layout of their space with a dedicated private bedroom.

The requirements in the spatial organisation to welcome visitors varied by the level of impairment. For those with mobility issues, there should be a clear sight line from the sitting space to the door, as well as sufficient proximity for a visitor to hear their greeting and welcome through the door.

4.5. Quality of Care

Space for assisted showering

None of the residents had an accessible bathroom. Resident 1 had a bathtub with an overhead shower attached to the wall. This both increased the caregiver's labour when assisting the mobility-impaired resident to bend forward and draw water with a bucket, as well as increasing the resident's risk of falling. Resident 3 had a small, enclosed shower booth (940mmx890mm). This was not preferred by the caregiver because it was not big enough for her to go in to assist with washing. Bathroom size was also problematic for Resident 1 as it did not have enough space for drying with her caregiver's assistance. For assisted showering, sufficient space is required for a caregiver for both washing and for drying off.

Independence and privacy in assisted showering

The amount of assistance required for showering varied by level of impairment. All residents wanted to do as much as possible themselves during showering to keep their independence and privacy. Resident 3, who only needed assistance in washing his legs and back and in drying, undressed himself by his armchair before the caregiver arrived, then washed himself in the shower with the curtain closed before he requested assistance, to maintain his privacy with her. Resident 1, who required assistance in every activity associated with showering except for undressing, could have had greater independence and privacy if the shower type was not the one attached to the wall. A detached hose-type shower could have allowed her to wash her private areas by herself.

Special consideration of the fittings, furnishings and fixtures in shower area is required for elderly people with mobility impairments. In addition, consideration should be given to the design of showering areas so as to allow the caregiver to keep out of the sight of residents for their privacy. The proximity of the space used for undressing to the bathroom is also important for improving privacy.

4.6. Other

Sunlight

All residents enjoyed natural lighting and sunshine; however, the access to sunlight varied due to both issues related to their impairment as well as spatial design. Resident 1 sat by the window to enjoy both the additional warmth as well as the natural light. Resident 2 opened the curtains only when it's sunny, because of his high privacy needs resulting from health concerns. Glare and reflection on the TV and PC screens limited access to natural light for Resident 3, who found it necessary to shut one of the curtains

during the daytime. In the design and placement of windows, there is a need to meet both enhanced requirements for privacy as well as controlled access to sunlight to limit glare on TV/computer screens.

Table 11: Analysis of themes for QoL and relevant design themes

Themes for QoL	Similarities	Differences*	Design themes
Independence and activities			
Circulation and space for movement	Desire for environments with no level changes	**(I)** Assistance requirements for walking **(I)** Suitable storage space for mobility vehicles	Spatial organisation (Interior/exterior) Floor design Door design
Spaces for sitting and various activities	Preference for spending most of the time sitting in an adjustable armchair	**(P)** Kinds of space required for varied activities **(I)** Required seating configuration for activities	Spatial organisation (interior)
Sense of control			
Ease of maintenance, keeping space clean and tidy	Preference for shelves of appropriate height and depth	**(I)** Preferences for floor finishes (floors to be cleaned easily). **(I)** Ability to access to storage	Flooring design Storage design
Control over visitors	Preference for a view to the door from their sitting space	**(PE)** views of visitors coming to the door	Spatial organisation (interior/exterior) Exterior elevation design
Privacy			
Space for privacy against passers-by	-	**(PE)** Degrees of concerns in privacy depending on oversight and distance between unit and path	Spatial organisation (interior/exterior) Exterior elevation design
High privacy needs for incontinence	-	**(I)** Degrees of privacy needs depending on the health issue	Spatial organisation (interior/exterior)
Relationships			
Socialising through communal activities	-	**(I)(P)** Ways of socialising with others	Communal space
Space for welcoming visitors	Preference for the separation of bedroom from the lounge	**(I)** Ways to welcome guests	Spatial organisation (interior)
Quality of care			
Space for assisted showering	Need for an accessible shower area and space for caregivers to assist washing and drying	**(PE)** Types of shower and the area **(PE)** Size of the space for drying	Size of space (shower area)
Independence and privacy in assisted showering	Wish to do as much as they could by themselves	**(I) (PE)** The amount of the assistance required	Equipment/fixture Spatial organisation (shower area)
Other			
Sunlight	Preference for sitting in the sunlight	**(I) (PE)** the degree of sunlight enjoyed	Spatial organisation (interior/exterior) Exterior elevation design

(I): differences by types/levels of impairments, (P): by preferences, (PE): by physical environments.

5. Design Consideration

Considerate design of interior space in individual units and adjacent facilities with regards to exterior space can improve the *QoL for older people with restricted mobility. Important design considerations are discussed for each design theme, integrating the information obtained through the analysis.*

5.1. Consideration for accommodating various levels/types of impairments and preferences

The design requirements for greater QoL are affected by type and level of impairments. There were also differences in the design requirements to accommodate individual preferences. Accordingly, it is necessary to provide different types of units that residents can choose from or increased flexibility in the design of housing units or complexes to accommodate the diversity in preferences. Alternatively, given that the level and type of impairments may change as people age, a universal design that meets different requirements could best support ageing-in-place and thereby enhance QoL.

5.2. Consideration for the design of rental housing for the elderly that improves QoL

Spatial organisation surrounding the sitting area and the sequential space (interior/exterior)

In the design of the space for people with restricted mobility, there should be careful consideration of the micro environment surrounding their sitting area. In particular, the sequence of space from the sitting area to the outside must be designed for access and control. The spatial organization should allow the layout of an adjustable armchair and adjacent tables and/or shelves to ensure things are within the reach to enhance control of their environment. Consideration of preferred activities can ensure that the space can accommodate intended use. For example, given that watching TV is a common activity, layouts should permit location and proximity of TV options with respect to armchair location and in addition, the adjacency of any windows to avoid glare on the screen. There should be enough space for visitors in the quasi-public areas of the unit and a separation of the lounge from the bedroom. The spatial organisation that allows residents to view visitors coming while the resident is seated improves their sense of control. The front door should be within sight of the sitting space as well as close enough for the voice to reach through the door. Windows should also be positioned to provide the resident outside views, but limit views from the outside to the inside.

Incontinence is a common problem for elderly people, the concerns of which can be worsened by restricted mobility. Locating a toilet as close to the sitting space or the bed as possible (less than 3 meters) could address this issue for some people. However, those with severe mobility concerns, accommodation should be made for toileting to occur in the lounge as well as in the bedroom through the use of a commode, or other device. There should be enough consideration in the spatial organisation of exterior space and placement of windows to meet the conflicting needs for high levels of privacy and other desires such as looking outdoors, welcoming visitors or just enjoying the sunshine.

Storage

Consideration in the design of storage spaces with regard to interior elevation as well as necessary floor area is required for the common amount of objects and furniture. Built-in shelves of appropriate height are generally preferred particularly in the bathroom and the kitchen. The kitchens observed in local-authority housing generally had cupboards/shelves that were too high for ease of access by their intended user. In an attempt to provide enough storage in the limited space, often the space was unusable for those

with limited mobility. The kitchen should be redesigned or enlarged so that it ensures enough useable storage.

Floor

Strategies for floor design with no level difference indoors as well as at the external door is required to meet the requirements of those with the highest levels of impairment. Interior floor design with no threshold could be a solution. There should also be consideration in the flooring materials with respect to maintenance, as people have a higher propensity to dirty the floor and a lower ability to clean it as the level of impairment increases. One resident wished for a non-slip tile floor for the entire unit, which could be easily cleaned by a steam cleaner; however, there is common preference for carpet for warmth. There should be consideration for easily cleanable materials that are warm to the touch.

Door

Hinged doors, particularly when combined with a threshold with a level difference, are difficult for those walking with aids such as a trolley and a walker frame to manipulate. Sliding doors, that do not require much strength to open, can be better suited. The door serves to maintain privacy and to retain heat; however, they can be difficult to manoeuvre for those with limited mobility and can take up valuable space. For example, doors between the laundry room and the bathroom, or the kitchen and the lounge could be removed.

Shower area

Special consideration of the type of shower enclosure and the degree of fixture and flexibility of the shower head is required to enhance independence of elderly people with mobility impairments. There should be no change of level in shower area. For assisted showering, there should be enough space for drying as well as washing to accommodate both the resident and a caregiver. In addition, showering areas should have fittings that enable assistance out-of-sight of residents to maintain their privacy. The design of walls and fixtures that could be held by the elderly with both hands to support their balance increases their safety and thereby their independence and privacy.

Communal space

In the design of communal space, there should be spaces that accommodate residents' preferred ways of socialising, such as meeting visitors in private common spaces as well as open organized activities. Flexible space and appropriate facilities as well as flexible operation should be provided to facilitate various preferred uses, such as personal potluck meals, mobile library visits, accommodating exercise machines as well as the organized activities. There should be consideration in the accessibility and distance between the communal space and the unit to suit those with limited mobility and those using mobility aids. In addition, location of toilets should be designed to meet the needs of those with incontinence and their guests.

6. Conclusion

As the population ages, there will be an increased demand for housing that can accommodate those impairments that typically correspond with ageing. This paper examined the challenges and the loss of QoL for three elderly people with impairments living in local-authority rental housing. Analysis found that

the design of housing that improves QoL requires solutions to accommodate a variety of conflicting needs derived from the diversity in user's preferences and the characteristics of their impairment. In the design of individual housing units and adjacent facilities, there is greater need for additional or reorganized space to accommodate caregivers and visitors and maintain residents' independence, privacy and other aspects important for their QoL.

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