User and Expert Perspectives on Designs for Converting Existing New Zealand Houses to Make Them Suitable for Ageing in Place

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Abstract
Personal factors and the limited housing choices for older people have produced a demand for ageing in place. Given the slow rate of adding new houses to the existing stock in New Zealand (Statistics New Zealand, 2013), it is essential to find effective design solutions for redeveloping the latter to achieve quality of life, wellbeing and independence for the elderly. This paper reports on the preferences of older New Zealanders for a number of such designs as well as comments from experts in the field. Two New Zealand housing types were investigated (early 20th century villas with a central corridor and 1940-60s single storey state houses). Two houses of each type were redesigned with different degrees of shared space. To meet the needs of the ageing population, New Zealand Lifemark standards were incorporated. The designs were presented to a group of design professionals and researchers into ageing for comments on their suitability. The same floor plans were examined by older New Zealanders through an online questionnaire survey. Findings from this study show people were least interested in schemes with shared living room, dining area and kitchen. The key design aspects identified by experts were having a good sized dwelling, good sized deck with easy access, (sunny) outdoor deck or verandah, sunny rooms, multi-purpose spaces, storage, spare room for short term guest, and accessible/lifetime design features.

Keywords: Housing alternatives, ageing in place, design solutions, typical New Zealand houses, existing housing stock.

Introduction

Provision of appropriate housing that meets the needs of seniors can make ageing in place viable. The decision of whether to modify or move house is dependent on a variety of factors including older people's health and physical situation, and their preferences and needs. However, they should be well informed before entering this stage.

While in 2013, 49.8% of New Zealanders owned or partly owned their dwelling, the average for the 65+ age group was 74% (Statistics New Zealand, 2015b). In addition, Statistics New Zealand (2017) suggest that in 2013, more than 70% (70.1%) of New Zealanders aged 65+ lived in dwellings with six or more rooms. Based on the Statistics New Zealand room standard (2014) a kitchen, living room and dining room are counted separately even if combined, so a six room dwelling is the standard three bedroom house. Additionally, in 2013 Statistics New Zealand (2015a) found approximately 30% of people aged 65+ in private dwellings were one-person households, and 50% of this age group were couple-only householders, meaning 80% of people aged 65+ either lived with their partner or alone. This implies that an ageing population could mean fewer people in each dwelling, a phenomenon that could be unsustainable in the future in terms of housing resources. Given the relationship between these two factors, the likelihood rises of having under-used dwellings in the future. This suggests more attention might be given to achieving more efficient dwellings in terms of housing resources.

The ageing population of New Zealand and the slow rate (around 1% per annum) of adding new dwellings to the New Zealand housing stock (Statistics New Zealand 1998, 2006, 2008, 2013a) coupled with the data above, reveals a mismatch between small older person households and existing housing. Even if people wish to move from a house that is too large to something more suitable, the latter is generally not available in their communities (Davey et al., 2004). Given this lack of appropriate housing more older people are likely to remain in their family home in the future, leading to the need to ensure these houses are properly insulated and heated, have easy access, are safe, and are affordable in terms of heating and maintenance (Davey, 2006). McChesney and Amitrano (2006) identified a number of benefits associated with retrofitting New Zealand houses including financial benefits through reducing energy costs and public and private health benefits through improved health and comfort.

Case study selection

Two New Zealand housing types were investigated for this paper (early 20th century villas and 1940-60s single storey state houses). Villas (1880-1920) are generally planned with a central corridor with rooms to each side (Shaw, 1991). "Typical villa features include bay windows and verandas facing the street, sloping hip roof and timber weatherboard cladding" (BRANZ, 2016). BRANZ (2016) also state "villas were the most popular new home design in New Zealand from the 1880s through to World War 1". According to Page and Fung (2008b), villas formed 5.3% of the New Zealand housing stock in 2006. The most significant point about villas is that they were built almost entirely of timber (BRANZ, 2016). One storey villas are more common, although a significant proportion in more wealthy suburbs have two

storeys (BRANZ, 2016). State housing (1940s-1960s) has served many types of families, including seniors (Firth, 1949). The layout of state houses varies. Typically they were oriented so as many rooms as possible received some sun. They also had recessed porches and were efficiently planned so there was minimal circulation space and service areas were grouped (BRANZ, 2016). Living rooms as the centre of family life tended to be larger and used most (Firth, 1949). Most state houses were "fairly small, with a roof pitch of about 30˚, and small casement windows" (BRANZ, 2016).

Design considerations

According to De Jonge et al. (2006) home modification for the 65+ age group means "conversions and adaptations to the permanent physical features of the home environment in order to reduce the demands from the physical environment and as a result, make tasks easier, reduce accidents and support independence". Statistics New Zealand (2013b) suggest there is an increasing demand for communal dwellings driven by the ageing population. Communal residential buildings such as co-housing have the capacity of attracting older people as they can provide assistance and companionship. Evidence from the UK DWELL project indicates that outdoor spaces can be shared particularly where they provide shared activities such as a barbecue (Park et al., 2016). In Australia, Judd et al. (2014) found that unlike other movers, older people who downsized are more likely to move into a form of multi-unit housing than a separate house.

Since the present study is conducted in New Zealand, the redesigned case studies dwellings must comply with NZ standards. The only available standard for housing for the 65+ is the private Lifemark Design standards (LM). This provides a star rating and points system within which every 'lifemark' home has to meet the requirements specified in one of three categories, including a 3-star lifemark home being fully adaptable in the future at minimal cost and a 5-star lifemark being fully accessible (Lifetime Design Limited, 2012). Many countries have similar standards, including the UK Lifetime Homes (LTH) and USA Universal Design (UD). In an investigation of infill development for older Australians using a collaborative design process, Baldwin et al. (2012) found universal and accessible design was important for the elderly. Specifics include "well-maintained safe walkways, outdoor environments including outdoor private space (patios and balconies), passive and active environmental features in the home, diverse housing options, places to meet, and access to services" (Baldwin et al., 2012, p.4). Additionally, Sutherland and Tarbatt (2016) investigated the design attributes of mainstream housing which had attracted downsizers. Although this housing development was not advertised for older people the application of lifetime home standards was one of the main reasons for their interest in it.

Given the aim of this research is to see whether converting existing houses to make them more suitable for an ageing population is both possible and desirable, it was decided to aim for compliance with 3-star LM. However, to ensure 3-star LM covers everything required it was first compared with two widely known international standards, the UK Life Time Homes (LTH) and the USA Universal Design (UD). Both aim to make houses usable for a wide range of occupants. Although LTH does not provide a fully accessible guide for dwellings, meeting this standard ensures houses are usable and adaptable. This is similar to LM 3-star.

Using the LM 3-star standard a villa and smaller state house were redesigned with different degrees of shared space. Three designs were produced for each house, ranging from subdivision (conversion to two smaller units), to having some shared spaces such as a guest bedroom, to private en-suite bedsitting rooms and all living spaces shared. Based on these scenarios schemes B and C provided separate units with a shared entrance for both villa and state house respectively (Figure 1), scheme D converted the villa into separate units with shared entrance, guest suite and study/sitting room (Figure 2), and schemes E and F provided private bedsitting rooms, with shared living spaces, guestroom/study for both villa and state house respectively (Figure 3). A detailed plan of each scheme was prepared for the pilot survey. This involved people aged 55+ and experts in the field of housing older people. Following feedback a simplified version of the floor plans was prepared for the main survey. The pilot survey process and changes made to the floor plans is beyond the scope of this paper. This paper only presents the final, simplified plans.
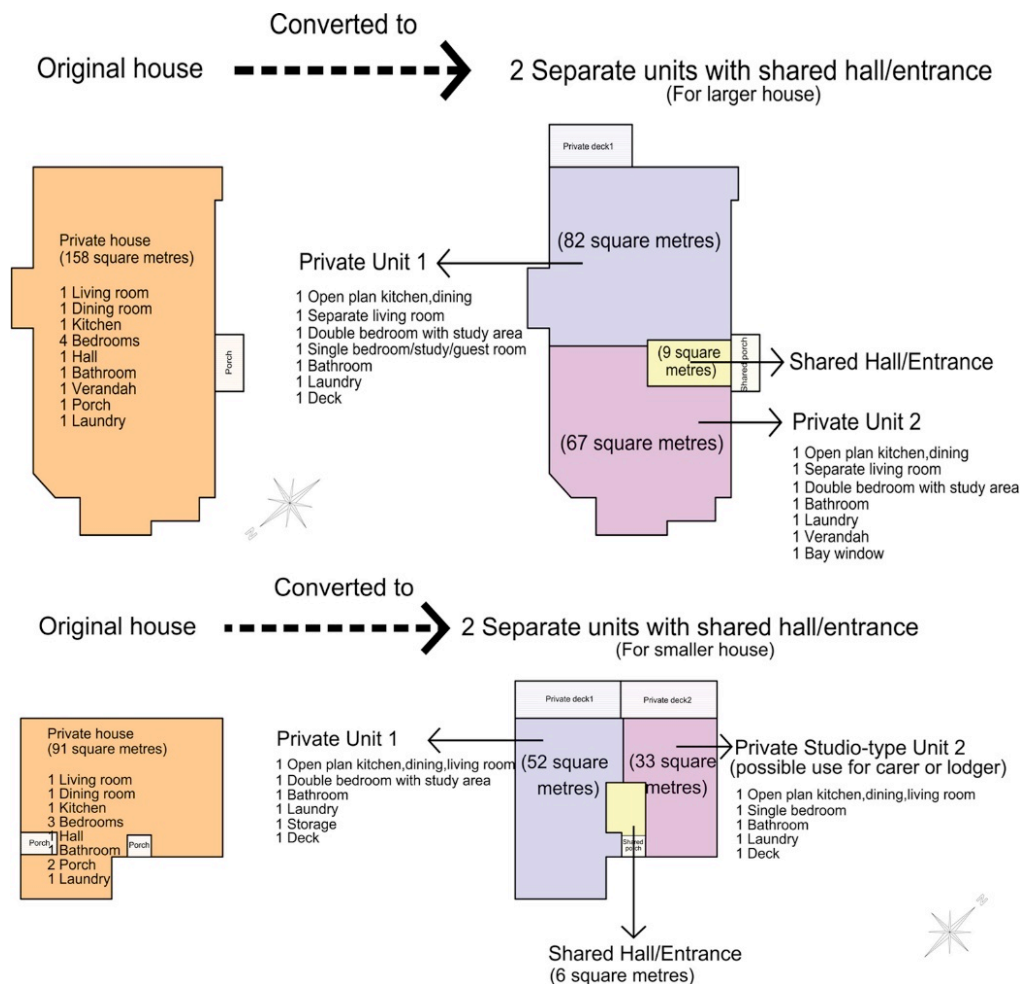

Figure 1: Top: Scheme B; Bottom: scheme C: separate units with shared hall/entrance
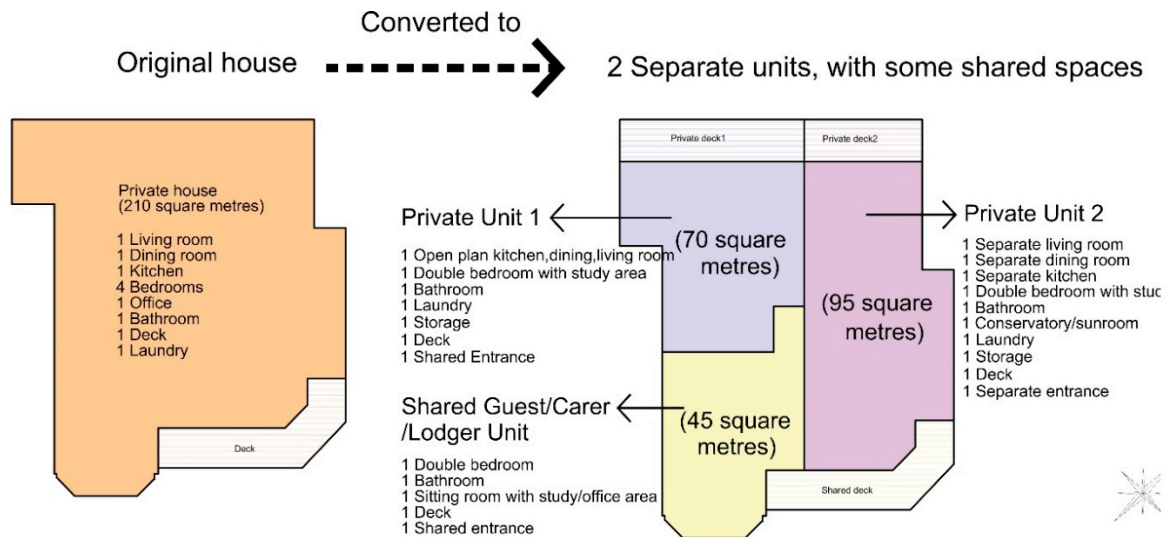
Converted to

Original house ▪▪▪▪▪▶ 2 Separate units, with some shared spaces

Private deck1 | Private deck2

Private house
(210 square metres)

1 Living room
1 Dining room
1 Kitchen
4 Bedrooms
1 Office
1 Bathroom
1 Deck
1 Laundry

Deck

Private Unit 1 ◀

1 Open plan kitchen,dining,living room
1 Double bedroom with study area
1 Bathroom
1 Laundry
1 Storage
1 Deck
1 Shared Entrance

(70 square metres)

Private Unit 2 ▶

1 Separate living room
1 Separate dining room
1 Separate kitchen
1 Double bedroom with stud
1 Bathroom
1 Conservatory/sunroom
1 Laundry
1 Storage
1 Deck
1 Separate entrance

(95 square metres)

Shared Guest/Carer /Lodger Unit ◀

1 Double bedroom
1 Bathroom
1 Sitting room with study/office area
1 Deck
1 Shared entrance

(45 square metres)

Shared deck

Figure 2: Scheme D: separate units with some shared spaces

Converted to

Original house ▪▪▪▪▪▶ Private Bed-Sitting rooms, with Shared Living Spaces, Guest room/study
(For larger house)

Private deck1 | Shared deck

Private house
(158 square metres)

1 Living room
1 Dining room
1 Kitchen
4 Bedrooms
1 Hall
1 Bathroom
1 Verandah
1 Porch
1 Laundry

Porch

Private Bed-sitting room 1 ◀

1 Double bedroom with study area/TV/Shelves
1 Bathroom
1 Storage
1 Deck

(25 square metres)

Private Bed-sitting room 2 ◀

1 Double bedroom with study area/TV/Shelves
1 Bathroom
1 Storage
1 Bay window

(28 square metres)

(105 square metres)

Shared porch

Shared Living Spaces, Guest room/study ▶

1 Open plan kitchen,dining
1 Open plan dining, sitting area, study
1 Separate living room with bay window
1 Single bedroom/guest room/study/office
1 Visitor's bathroom
1 Hall/entrance
1 Laundry
1 Porch
1 Deck
1 Verandah

Converted to

Original house ▪▪▪▪▪▶ Private Bed/Sitting rooms, with Shared Living Spaces, Guest room/study
(For smaller house)

Porch

Private house
(100 square metres)

1 Living room
1 Dining room
1 Kitchen
2 Bedrooms
1 Sun room
1 Hall
1 Bathroom
2 Porches
1 Laundry

Porch

Private Bed/sitting room 1 ◀

1 Double bedroom with study area/TV/Shelves
1 Bathroom

(18 square metres)

Private Bed/sitting room 2 ◀

1 Double bedroom with study area/TV/Shelves
1 Bathroom

18square metres)

(64 square metres)

Shared deck

Shared porch

Shared Living Spaces,Guest room/study/sitting room ▶

1 Open plan kitchen,dining
1 Separate living room
1 Single bedroom/guest room/study/sitting room
1 Visitor's bathroom
1 Hall/entrance
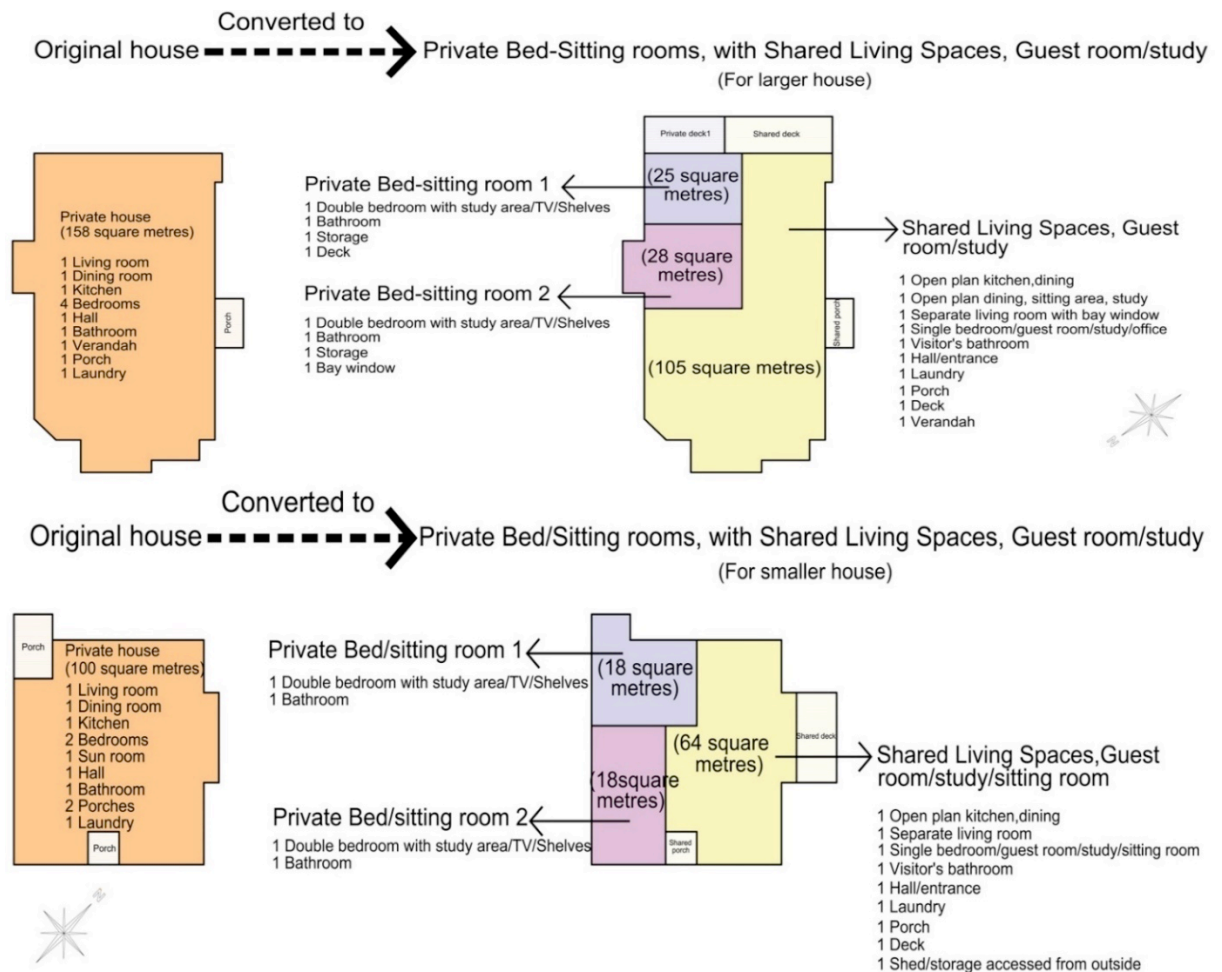1 Laundry
1 Porch
1 Deck
1 Shed/storage accessed from outside

Figure 3: Top: Scheme E; Bottom: scheme F: private bedsitting room, with shared
living spaces

Scheme A investigates sharing outdoor areas, regardless of interior design. It has three options for converting a section (house plot) (Figure 4). The lettering of the schemes is based on the order they appear in the survey.
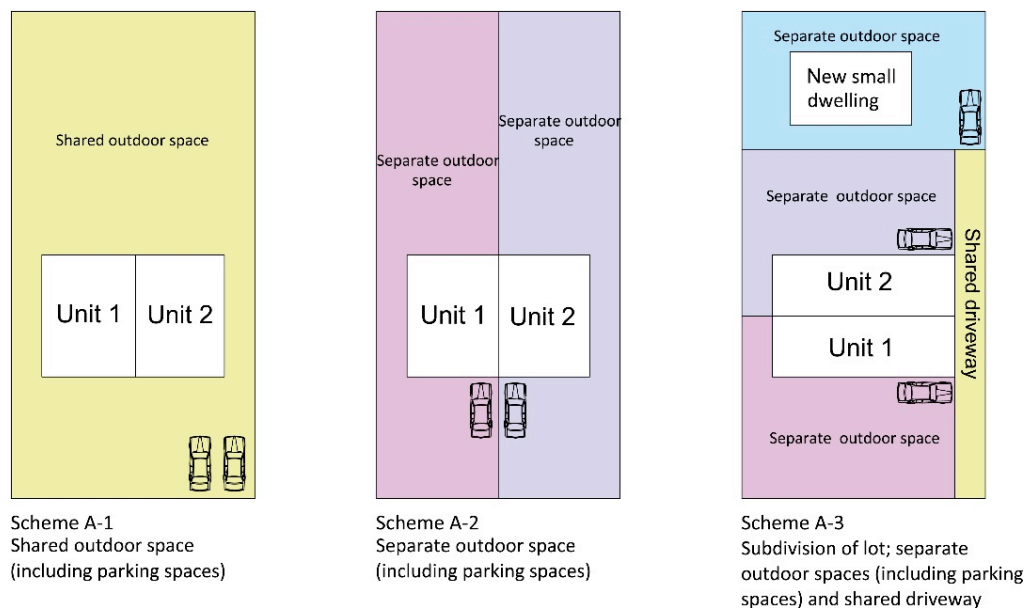

Scheme A-1
Shared outdoor space
(including parking spaces)

Scheme A-2
Separate outdoor space
(including parking spaces)

Scheme A-3
Subdivision of lot; separate outdoor spaces (including parking spaces) and shared driveway

Figure 4: Scheme A - Subdivision of outdoor space and section (house plot)

The Survey

There has been considerable research into integrating older users into the design process. Baldwin et al. (2012, p.4) used participatory methods in an investigation of the preferences of older Australians in South East Queensland. They first identified "supportive mechanisms and challenges" for older users in both the neighbourhood and dwelling using the photovoice method and then used charrettes to involve seniors in the design process. In the UK University of Sheffield DWELL project, the research team worked with a range of stakeholders and local residents on what made a good downsizer home (Park et al., 2016). In an investigation of downsizing in Australia, Judd et al. (2014) collected data from a national questionnaire based survey, in-depth interviews, and through policy forums. The questionnaire, which was distributed through a magazine for seniors was answered by 2767 older people who had moved since turning 50. The survey was followed by in-depth interviews with 60 survey respondents from three Australian states (Judd et al., 2014).

Since a survey has worked in other research on housing and older people, as part of a PhD study on a resource assessment of housing alternatives for the ageing population in New Zealand, an online survey using Qualtrics (2017) was conducted from 12th of May 2017 and is still underway. The aim is to obtain comments on a number of the proposed conversion options, particularly what people think about sharing rooms and other spaces. To limit the scope, the questionnaire targets people aged 55-85, as research suggests this is the age when people consider moving from their family home (Park et al., 2016). In another study on downsizing in Australia, Judd et al. (2014) included people of 50 in a pre-retirement course on making decisions about their future housing. The survey is anonymous and a snowballing recruitment method is being used involving a number of national and local authorities and organizations.

These include the University of the Third Age, Age Concern New Zealand, Grey Power Federation, Wellington City Council (Neighbourhood Development Centre), Senior Net, and Friendship New Zealand Inc. The survey was designed to address the following questions:

- Do people like the idea of shared living spaces?
- Which type of shared living arrangement is most preferred?
- Which outdoor arrangements are most preferred?
- What features of their house would people like to share and with what age group?
- Do the schemes specified in the study meet their requirements?
- What features might influence their perception of sharing their houses?

The first pilot survey was conducted from 7th of April 2017 to 20th of April 2017. The participants were people aged 55+ and experts either in the field of ageing from New Zealand and overseas or construction/design professionals. Three people aged 55+, five researchers into ageing, five design experts and two people expert in both areas took part (Table 1). The researcher sat with four researchers and two people aged 55+ whilst they filled out the survey to witness any problems they had and where the questionnaire had to be explained more fully. The experts in this case only went through the fourth part of the questionnaire where they provided comments on the survey. Revisions were made as a result of the first pilot survey and a second pilot conducted. Only the results from the first pilot and main survey to date are reported in this paper. The characteristics of the experts are given in table 2.

		Invitations sent	Online survey participation (full)	Survey filled out with researcher (partial)	Age group (excluding partial responses)			
					65-74	75-84	85+	Under 65
Pilot1	Experts	13	8	4	3	2	0	7
	55+	8	1	2	1	0	0	2

Table 1: First pilot study participants

		Pilot survey 1 sample	
		Frequency	**Percentage**
Gender	Female	4	50
	Male	4	50
Age group	65-74	3	37.5
	75-84	2	25
	85+	0	0
	Other	3	37.5
Household type	One person household	2	25
	Couple only household	6	75
	Other	0	0
Ethnicity	European/Pakeha	8	100
	Other	0	0

Table 2: Characteristics of expert respondents who completed pilot survey 1

Following revisions, the main survey commenced and still is ongoing. The analysis presented here was based on the 110 completed surveys up to 26th of May 2017. Table 3 gives the characteristics of successful respondents in the main survey to date.

		Samples in this study	
		Frequency	**Percentage**
Gender	Female	83	78.3
	Male	23	21.7
Age group	55-64	23	21.7
	65-74	54	50.9
	75-85	29	27.4
Current household type	One person household	40	37.7
	Couple only household	48	45.3
	Other	18	17
Ethnicity	European/Pakeha	101	95.3
	Other	5	4.7

Table 3: Characteristics of 55+ respondents in the main survey to date

Participants were asked to comment on the proposed schemes A-F, even if they had not yet thought about moving or downsizing. The first part of the questionnaire asked for background information and the second part about the current housing situation of each participant. Part three presented the schemes and asked for participants' preferences regarding the degree of sharing of spaces. They were required to assume that they would only be sharing a house with people they wanted to live near or with.

To evaluate the preferences of experts and people aged 55+ aged data from pilot survey 1 and the main survey to date were collated. To conduct further analysis, the following were taken into account:

- Only comments from the 8 experts who successfully completed the first online pilot survey were analysed for this paper.
- The analysis included the data provided by the 55+ participants in the main survey (n=110)
- Results from the second pilot survey were excluded.

Results

Approximately half of those aged 55+ who successfully completed the online survey (48.1%) stated they had thought about moving when they get older whereas 11.3% plan never to move. Only 18.9% have already moved with 21.7% intending to move. Excluding those who have already moved and who plan never to relocate, approximately 70% of respondents in the main survey could be considered potential users of the types of converted houses proposed in this study.

The results were compared for differences in age group and gender. For each data set, several independent sample t tests were performed in SPSS to see if differences in various rating scales are statistically significant by gender. In addition, several ANOVA one-way tests were performed to see if differences in rankings are statistically significant by age group. Where a significant difference emerged in the ANOVA one-way tests, a further post-hoc multiple comparisons using Tukey's HSD test was performed to look at possible significances between subcategories of each group. Other potentially influential parameters such as current housing situation, household type, and ethnicity were not investigated here. As this work is on-going the results are indicative and not finalised.

Scheme A – subdivision of outdoor space and section (house plot)

Respondents were asked to rate on a scale of 1-5 (1- Not at all, 3- Neutral and 5- Very much) two ideas about shared outdoor areas (Figure 4). Scheme A-1 shared outdoor areas including parking spaces, garden, and BBQ. Scheme A-3 subdivided the lot with separate outdoor spaces (including parking) and shared driveway. Table 4 presents mean scores of participants based on age group and gender. From the ANOVA one-way tests, no statistical difference was seen by age group for schemes A-1 and A-3 ($F_{(2,98)} = 0.318$, $p = 0.728$ and $F_{(2,98)} = 0.354$, $p = 0.703$). The results of the independent samples t test show that means in schemes A-1 and A-3 are not statistically different by gender ($t_{(99)} = -0.734$, $p = 0.465$ and $t_{(99)} = 0.397$, $p = 0.692$). Overall respondents liked the idea of subdivision (Figure 4: scheme A-3) more than shared outdoor spaces (Figure 4: scheme A-1) with means of 3.36 and 2.34 respectively.

		Scheme A-1			Scheme A-3		
		Mean	**N**	**Std. Deviation**	**Mean**	**N**	**Std. Deviation**
Age group	**55-64**	2.35	23	1.301	3.43	23	1.273
	65-74	2.24	50	1.393	3.42	50	1.311
	75-85	2.5	28	1.427	3.18	28	1.362
Gender	**Female**	2.28	78	1.385	3.38	78	1.341
	Male	2.52	23	1.344	3.26	23	1.214
Total		**2.34**	101	1.373	**3.36**	101	1.308

Table 4: Mean and Standard Deviation of ratings by participants on sharing outdoor areas by age group and gender

Schemes B and C – separate units with shared hall/entrance for large and small houses

Table 5 presents means for conversions of the original house into two separate units with shared hall/entrance for different size dwellings (Figure 1). The results of the ANOVA one-way tests show that regardless of the size of the dwellings, means for both schemes are not statistically different by age group ($F_{(2,94)} = 1.471$, $p = 0.235$ and $F_{(2,92)} = 0.874$, $p = 0.421$). Similarly, the independent samples t test did not show a significant difference by gender for both schemes ($t_{(95)} = 0.834$, $p = 0.406$ and $t_{(93)} = -0.350$, $p = 0.727$).

		Scheme B			Scheme C		
		Mean	**N**	**Std. Deviation**	**Mean**	**N**	**Std. Deviation**
Age group	**55-64**	2.36	22	1.093	2.45	22	1.184
	65-74	2.67	48	1.078	2.51	47	1.196
	75-85	2.26	27	0.984	2.15	26	0.925
Gender	**Female**	2.53	75	1.082	2.38	74	1.107
	Male	2.32	22	0.995	2.48	21	1.209
Total		**2.48**	97	1.062	**2.40**	95	1.124

Table 5: Mean and Standard Deviation of ratings by participants on sharing an entrance to a separate unit by age group and gender

The mean ratings for the smaller house are only slightly less than for the larger house (difference 0.08) suggesting that size is not the only thing people find important.

Scheme D – separate units with some shared spaces

In scheme D, the original house is converted into two separate units with shared guest room, extra sitting area and corridor (Figure 2). To see if means are statistically significant by age group an ANOVA one‑way test was performed in SPSS and showed a significant difference by age group for both the idea of sharing an entrance and guest suite and the idea of having a live-in carer occupying the shared guest suite at 0.05 level ($F_{(2,92)} = 3.239$, $p = 0.044$ and $F_{(2,92)} = 3.448$, $p = 0.036$). To look at significance between age groups a post‑hoc multiple comparisons using Tukey's HSD test was performed for these two ideas. The results show the mean of age group 65-74 is considerably higher than age group 75-85 (M=0.723, SD=0.287) but not different from age group 55-64. This suggests that participants aged 65-74 had a stronger preference for sharing an entrance and guest suite than the older cohort, who might be expected to be attracted by the idea of having a live-in carer. The post‑hoc test for having a live-in carer did not show a significant difference by age group (Table 6).

		Scheme D-1: sharing an entrance and a guest suite			Scheme D-2: having a live-in carer occupy the shared guest suite			Scheme D-3: having a lodger occupy the shared guest suite for extra income		
		Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation
Age group	55-64	2.55	22	1.143	2.59	22	1.182	2.5	22	1.263
	65-74	**2.91**	47	1.231	3.19	47	1.135	2.68	47	1.416
	75-85	**2.19**	26	1.096	2.5	26	1.364	2.08	26	1.412
Gender	Female	2.69	74	1.238	2.96	74	1.276	**2.65**	74	1.418
	Male	2.43	21	1.076	2.52	21	1.078	**1.86**	21	1.108
Total		2.63	95	1.203	2.86	95	1.243	2.47	95	1.39

Table 6: Mean and Standard Deviation of ratings by participants on the idea of shared spaces by age group and gender

In addition, an independent sample *t* test was performed to see if the means differed significantly by gender. The results show that the mean for having a lodger for extra income is just statistically significant by gender at 0.05 level ($t_{(93)} = 2.358$, $p = 0.020$), with females being more attracted to this idea than males (Table 6).

Schemes E and F – private bedsitting rooms, with shared living spaces for large and small houses

The results of the independent samples t test showed that means for features of both schemes E and F are not statistically different by gender. The ANOVA one-way tests in SPSS also showed no statistical difference by age group for features of schemes E and F.

	Scheme E-1: sharing kitchen and living areas/ private bed-sitting room and en-suite bathroom for large house			Scheme E-2: shared deck for a large house			Scheme F-1: sharing kitchen and living areas/ private bed-sitting room and en-suite bathroom for a small house			Scheme F-2: shared deck for a small house		
	Mean	N	Std. Deviation	Mean	N	Std. Devia-tion	Mean	N	Std. Devia-tion	Mean	N	Std. Devia-tion
55-64	1.86	21	1.062	2.14	21	1.014	1.86	21	1.014	2.29	21	1.146
65-74	1.83	47	1.148	2.11	47	0.961	1.91	47	1.176	2.19	47	0.97
75-85	1.27	26	0.533	1.85	26	1.084	1.52	25	0.714	2.12	25	1.201
Female	1.74	73	1.068	2.05	73	1.039	1.87	72	1.1	2.17	72	1.113
Male	1.48	21	0.814	2	21	0.894	1.52	21	0.75	2.29	21	0.902
Total	**1.68**	94	1.018	**2.04**	94	1.004	**1.8**	93	1.038	**2.19**	93	1.066

Table 7: Mean and Standard Deviation of ratings by participants on shared spaces by age group and gender

As can be seen in Table 7, regardless of the size of the original dwellings, the low average ratings given to the idea of shared living areas of less than 2, suggest that this idea was not appealing to many participants. Sharing a deck in either house was rated marginally better, but still well below the 3.0 neutral position.

Discussion

Figure 5 summarises how participants felt about sharing features in the proposed schemes (the scheme lettering relates to Tables 4-7).
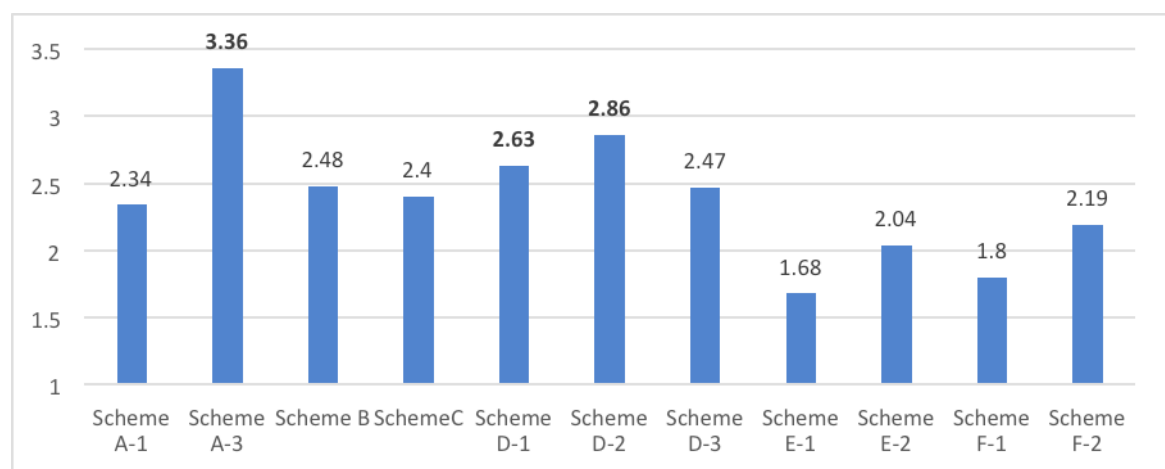
Figure 5: Mean scores for conversion options based on Tables 4-7

Given a mean of 3 is neutral, only sharing a driveway in scheme A-3 is viewed positively. All other mean figures are less than 3 suggesting the participants aged 55+ are not willing to share spaces and features within their dwellings. The only other scenario that is attractive to some (mean 2.86) is the idea of having a live-in carer occupying the shared guest suite, and perhaps sharing an entrance and guest suite (mean 2.63). The lowest mean scores were for both schemes with private bed-sitting rooms and shared living space.

Design preferences from pilot surveys

As well as the quantitative analysis above the comments on both pilot surveys were also useful in knowing what people did and did not like about the schemes. Table 8 summarises the comments from experts. Features that are both liked and disliked are in bold.

Dwelling type	Most commonly *liked* features	Most commonly *disliked* features
Schemes B and C: separate units with shared entrance/corridor		
Villa	•Adequate distance between living rooms and bedrooms between two separate units so noise is not an issue •Different sized units to suit different needs/budgets •Outdoor deck or verandah •Getting sun into both units and outdoor spaces •Multi-purpose spaces •Small bays/nooks within living rooms •Good size of rooms in original villa •Privacy but the chance to meet your neighbour at the entrance. •Study/work space in dining room •Independent units •**Separate living and kitchen/dining**	•No sun for kitchen/dining room •Access to deck through bedroom •Lack of storage space •Having only one bedroom •**Separate living and kitchen/dining** •Laundry cupboard in the kitchen
State house	•Sunny decks •Good sized deck off both living areas •Separate decks •Getting sun into both units •Study area •**Open plan living, kitchen and dining** •Sunny living areas •Spare bedroom •Ability to use 2nd unit for boarder or carer •Accessible/lifetime design features	•Bathroom and toilet next to the front door •Lack of storage. •Potential acoustic problem •Small units/bedsits/bedrooms •**High degree of integration of living/dining/kitchen** •Laundry cupboard in the kitchen
Scheme D: separate units with shared entrance, guest suite and study/sitting room		
Villa	•Additional shared space •Potential accommodation for carer if required •Separate laundry •Good solar access •Good amount of outdoor space provision •**The idea of a mixture of independent and communal living** •Separate independent entrance	•Small deck area •Dark shared corridor •Shared sitting area •**Sharing spaces**
Schemes E and F: shared living spaces/guest room and private bed-sitting rooms		
Villa	•Not being open plan •Separate storage areas •Being spacious •Private bathrooms and also one shared •Two living rooms •Storage shed	•The bed-sitting rooms are really only bedrooms, not suitable for other functions such sitting •Access to the storage for unit 2 from guest room •No private outdoor space for one bedsit •Too much communal space •Not a lot of private space for occupants.
State house	•Lifetime design •Sunny shared living area and deck •Lots of storage •Having three bathrooms is too much	•The laundry in the kitchen •Bedsitters too small for a sitting function •Very small unit is not adequate •Needs more outdoor space and storage •Communal storage •Outside access to storage shed •Bedsit 1 does not get much sun
Scheme A: Subdivision of lot		

	•Private outdoor area but reduced in size •The third unit could be rented or sold for additional income or to cover the cost of the upgrade of the existing building •Good way to generate income from unused land	

Table 8: Summary of comments from experts in pilot survey

Below are preliminary lessons learnt for converting existing houses for an ageing population:

- When it comes to the smaller units, getting enough sun inside and having a good sized sunny deck is important.
- Open plan living, kitchen and dining areas are both liked and disliked. Conversions should provide both so people have the choice.
- Participants have varying preferences when it comes to sharing accommodation and providing a variety of degrees of sharing would be ideal.
- Given the concerns about the size of units and bedsits in the state house there may be a minimum house size for successful conversion to smaller units.

Conclusion

The results of the surveys and comments from the pilot study could be useful for designers when altering existing houses to make them more suitable for ageing in place. Converting houses into smaller units that are easier to heat and meet Lifemark Home standards seems like a good idea but is not be worth doing unless people want to live in them. However, people are more positive about sharing outdoor space and subdividing large plots.

The experts were more positive about the designs and liked specific features such as sunny rooms and decks, multi-purpose spaces, a spare room for guests, accessible/lifetime design features.

This work is still in progress and one intention is to hold focus groups with those aged 55+ to talk through the designs and gain greater understanding of what housing they want and can afford and that will allow them to age in place with a good quality of life.

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