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The Influence of Simulated Home and Neighbourhood Densification on Perceived Liveability

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Abstract This study experimentally manipulated neighbourhood density and home location to reveal the effect of these changes on perceived liveability. Two hypothetical scenarios were provided to 106 households using a Computer-Aided Personal Interview (CAPI). The first scenario examined a densification of the participant's current property, and the second scenario examined a change to the location of the participant's home. Current home location, key destinations and alternative locations were recorded using an integrated Geographic Information System (GIS) interface. The findings show that people do optimise their location based on factors such as accessibility and transport distances to key locations. When given the choice to relocate to a range of different neighbourhoods, people trade closer travel distances in order to maintain a friendly, safe, clean neighbourhood environment. Home-owners are loss-averse when it comes to densification, but older home owners and those with larger homes have relatively fewer barriers to land area reduction.

Keywords Home liveability · Neighbourhood liveability · Density

1 Introduction

The desire for space and its importance to our quality of living is reflected in a trend towards living in larger homes and the spread of cities and transportation networks. In the United States houses have doubled in size, and per person residential living space increasing by approximately three times since the 1950s (Wilson and Boehland 2005).

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In New Zealand the average size of new houses has increased by 12% (20 m^2) in the last decade to 195 m^2 (Statistics New Zealand 2010). Under the normal economic constraints of the housing market, most residents have to make the trade-off between liveability (e.g. home satisfaction) and access to key infrastructure (e.g. shopping and public transport) and transport stress (Howley et al. 2009a).

This study experimentally simulates scenarios where individual property areas and houses are reduced in size and individual neighbourhoods are increased in density. The experimental design reveals perceptions of relative liveability under different living conditions to better understand which characteristics are important to our decision-making processes when selecting a home and neighbourhood.

Arguments for sustainability encourage compact urban form, placing people closer to key amenities, providing better infrastructure (due to the economies of scale from a dense population), and consequently improving energy efficiency and reducing vehicle emissions (e.g. Banister et al. 1997). Whereas arguments for liveability suggest that home satisfaction, personal security, social interaction and feelings of community are improved in medium to low density living environments (e.g. Bramley et al. 2009). As both arguments make valid cases, it has fallen to social scientists to more closely scrutinise the decision-making process behind priorities that are divided by the density of the living environment.

There is evidence that current high-density urban form fails to deliver on social contact and environmental quality, which reveals how important it is that we learn more about the specific elements that fail if high-density, sustainable living is to be a preferred future form. Howley et al. (2009a) established that those that chose to live in the Dublin CBD had future aspirations for lower density living. In another study, Howley et al. (2009b) points out that factors related to residential dissatisfaction, such as poor environmental quality (litter, graffiti), heavy noise and traffic, and a lack of community, also relate to high-density living.

Walton et al. (2008) examined the residential quality of 369 people living in Auckland (New Zealand's largest city), and found that people do make trade-offs between different density neighbourhoods. For example, high density neighbourhoods were favoured for good public transport and connectedness, whereas medium density neighbourhoods were favoured for high-quality schools. Bramley et al. (2009) also found trade-offs between high-density living, where public transport services were better, and medium-density living, where social networks in the neighbourhood were better. Overall, Ucklander's quality of life did not differ by density, which the authors suggested was because people are generally happy making trade-offs to suit their own lifestyle needs (Walton et al. 2008).

There is a methodological concern with measuring liveability, such that directly asking people about their current housing situation is likely to yield limited results (e.g. Dolan et al. 2008; Parmenter 1994). People may even react defensively, feeling that the logic of their individual decision-making processes is under threat, which can lead to a bias based on cognitive dissonance (see Festinger 1957). A consumer may defend their purchase behaviour by biasing their attitudes more favourably towards a product than is actually the case. For example, Losciuto and Perloff (1967) found that when given the choice between two records albums that were rated as similarly attractive; the record they selected was subsequently rated more highly than the record that was not chosen. Prospect Theory suggests that people are loss averse and attempt to maintain what they have, even if the good is redundant to their lifestyle (see Tversky and Kahneman 1991).

Evidence from Gilovich et al. (1995) suggests that dissonance is heightened in an active purchasing decision, where a consumer has taken a direct action to purchase (as opposed to a non-purchase), as this action is more memorable and consumers feel more responsible.

Consequently, New Zealand home owners perceive their housing and location choices to be optimal for their lifestyle (Walton et al. 2008).

This study uses Computer-Aided Personal Interviewing (CAPI) with integrated Geographic Information System (GIS) mapping software to compare participants' current home and neighbourhood (baseline) to simulated, denser living scenarios. The use of CAPI allows a visual presentation of different home types, and the use of GIS allows a realistic presentation of different neighbourhoods in a geographically relevant location to participants. The benefit of the methodology is that the interactive survey delivery mechanism allows the participant to be more engaged in the questionnaire (e.g. Baker 1992), and the additional cues offer a deeper and more realistic level of experimental manipulation than other survey techniques (e.g. Couper 2005). Consequently, the simulated behaviours have high external validity with revealed behaviours (e.g. Lamb and Walton 2010).

The effects of reduced property area, reduced home size, and relocation to a denser neighbourhood location are simulated to reveal what people really lose or gain when their living situation is densified, and who is adaptable to higher-density living. It is hypothesised that (1) a reduction in land area or home size will decrease home liveability, (2) a change in home location to a 20% denser neighbourhood will decrease neighbourhood liveability, and (3) overall travel distances to key locations will reduce in the new, denser home location.

2 Method

2.1 Participants

Participants were 106 homeowners (61.3% female). The average reported age was 55.6 years, and the modal household income bracket was $70,000–$100,000NZ. In order of frequency, the main activities reported by the sample were full-time paid employment (39.6%), retired (34.0%), part-time paid employment (12.3%), caregiver for family or household (10.4%), unemployed (2.8%), and education (0.9%). Most participants (92.5%) had lived in the region for more than 10 years and agreed that they new the region well (83.0%).

2.2 Sampling Methodology

The sample frame was randomly drawn from meshblocks[1] in Lower Hutt, New Zealand. Table 1 provides key urban density statistics that place New Zealand in relation to other example locations and the world. A list of every residential meshblock in the sample area was stratified by average property size to ensure a range of high, medium and low property densities were sampled. The range of meshblocks was trimmed using the largest (1,185 m^2) and smallest (10 m^2) common property sizes (see Table 1) to remove the extreme or abnormal meshblocks where the average property size was outside these parameters. The medium density strata encompassed half a standard deviation either side of the median, and the upper and lower quartiles formed each of the high and low density strata. The high density strata had a median of 179 m^2/person ($M = 183$, $SD = 40$), the

[1] Meshblocks are the smallest geographical unit used by Statistics New Zealand for data collection, such as the five-yearly census (Statistics New Zealand 2009).

Table 1 Key population statistics (Source: Evans and Hartwich 2005; United Nations 2008)

Population statistics	New Zealand	United Kingdom	United States	World
Total population (thousands) 2005	4,097	60,245	299,846	6,514,751
Land area (km^2) 2005	267,990	241,930	9,161,920	129,830,789
Urban settlements (percentage of land area) 2000	3.0%	22.9%	8.2%	2.7%
Percentage of urban dwellers 2005	86.0%	90.0%	81.0%	49.0%
Density (per km^2 of urban extent) 2005	437	976	321	902
Average new dwelling size (m^2) 2005	196	76	202	–

medium density strata had a median of 233 m^2/person ($M = 237$, $SD = 49$), and the low density strata had a median of 319 m^2/person ($M = 324$, $SD = 75$).

Five meshblocks were selected at random from each stratum. An interviewer visited each house in a given meshblock. Apartment residents were excluded because they lived in the highest density housing and therefore could not be experimentally moved into a denser category. Higher-density house types were represented by flats and terraced houses (see Fig. 1; Table 2). If the house was occupied, and was owned by the occupant, the householder was invited to participate. The response rate was 67%.

2.3 Materials

2.3.1 Survey Items

The survey contained 76 items and was presented via Computer-Aided Personal Interview (CAPI), including Home Liveability, Neighbourhood Liveability, geographic information, and key demographics (see Table 2). Measures of Home Liveability and Neighbourhood Liveability were repeated within the subjects across the two scenarios, with every participant receiving both scenarios (see Sect. 2.4 for more detail).

The Home Liveability items were developed to measure participants' judgements of their home's attributes relative to their needs, and formed a scale with a Cronbach's Alpha of 0.91.[2] The Neighbourhood Liveability items were adapted from Walton et al. (2008), taking the item with the highest corrected-item total correlation from each of the twelve main scales measuring different aspects of residential quality using the PREQ (Perceived Residential Environmental Quality scale; Bonaiuto et al. 2006). The remaining three items measured perception of neighbourhood value-for-money, neighbourhood restriction on lifestyle, and ease of travelling to work. As expected, the items did not form a coherent scale, nor useful sub-scales. Therefore, the analysis of neighbourhood liveability was performed on individual items.

2.3.2 Home Selection

Architectural drawings depicting the 20 most common types of homes in New Zealand were developed to help the participant identity the type of home that they live in. These

[2] The Home Liveability item relating to off-street parking had a low corrected item-total correlation, and was removed from the scale to increase the Cronbach's Alpha from 0.77 to 0.91.

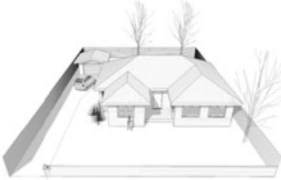
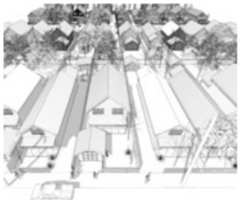
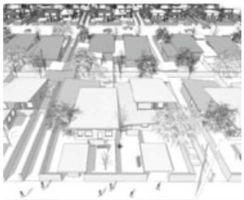
Type of home	Front view	Aerial View
Medium size house and medium density neighbourhood		
Large colonial house		
Medium flat		
Large terraced house		

Fig. 1 Architectural drawings of the front and aerial views of four common New Zealand home types

drawings were also used to represent the replacement house participants were given in Scenario 1. Participants were able to vary building style (apartment, terrace, flat, house, and colonial house), size (small, medium and large) and neighbourhood density (high, medium and low) until they found a drawing that was a reasonable approximation of their home. Each type of home was depicted by two images, a front-view to show the house and property, and an aerial image to show the density of the neighbourhood (see Fig. 1 for example pictures), alongside information regarding the number of bedrooms and land area (see Table 2).

2.3.3 Geographic Information System (GIS) Interface

The survey required the participant to indicate important locations, including their home, place of main activity (typically work), place of partner's main activity, and one other important location. A map of the Wellington region was presented using a Geographic

Table 2 Example items, number of items and scale ranges for home liveability, neighbourhood liveability, geographic information, and demographic items in the questionnaire

Survey measure	Examples	Number of items	Scale range
Home liveability	Building size, ease of entertaining friends, privacy, noise, outdoor space (see Table 6 for the full scale). e.g. "Please rate the noise from your neighbours", 0 = "Very loud", 10 = "Very quiet"	11	0–10
Neighbourhood liveability	Neighbourhood aesthetics, building density, distance to CBD, public transport access, graffiti, residential pride (see Table 8 for the full scale). e.g. "Buildings in my neighbourhood are unpleasant to look at", 1 = "Strongly disagree, 5 = "Strongly agree"	15	1–5
Geographic information	Geographic location of home (and land value), main activity (typically work), partner's main activity, another main activity, relocation neighbourhood (and familiarity with neighbourhood), and ideal neighbourhood (see GIS interface)	11	–
Demographics	Education, income, age, gender, ethnicity, employment status, years in residence, familiarity with region, number of household occupants, main travel mode, number of children, school zone, and family structure	13	–

Information System (GIS) interface embedded in the survey. This enabled additional information about each property to be obtained (e.g. capital value, land value, land area), as well as latitude and longitude coordinates for calculating distances between the key locations.

2.4 Procedure

2.4.1 Baseline Measures

After locating their home and key travel destinations using the GIS interface, participants examined the architectural drawings of buildings until they found one that was a reasonable match to their current home. Participants then rated their homes using the 11-item Home Liveability Scale, and their neighbourhoods using the 15-item Neighbourhood Liveability Scale.

2.4.2 Scenario 1: Replacement Home with Smaller Property Area

Participants were asked to imagine that their neighbourhood had been redeveloped and that their property area was reduced. Property area was decreased according to the schedule in Table 3. Participants were shown drawings of their new home, with their old home as a reference. In situations where the building was already in the high density category, then a smaller type of building was selected. Participants then rated the replacement home on the Home Liveability Scale.

Participants were also asked to compare the size of their original property with their replacement property to examine the effectiveness of the independent variable manipulation. Participant responses were rated on a 0 to 10 scale anchored from "My replacement house was smaller" to "My replacement house was larger", with 5 labelled "About the same". Those participants that reported that their house was larger ($n = 6$) were removed from all Scenario 1 analyses, as they did not understand that their replacement house size did not increase.

Table 3 Building type and characteristics of current home and the type of replacement home for each category

Actual house type	Density	Bedrooms	Section size (m^2)	Type of house after densification
Large house	Low	4–5	1,185	Large house (medium density)
Large house	Med	4–5	890	Large house (high density)
Large house	High	4–5	565	Terraces large
Med house	Low	3–4	942	Med house (medium density)
Med house	Med	3–4	620	Med house (high density)
Med house	High	3–4	360	Terraces med
Small house	Low	2–3	770	Small House (medium density)
Small house	Med	2–3	350	Small house (high density)
Small house	High	2–3	210	Terraces small
Colonial house large	–	3–4	372	Terraces large
Colonial house medium	–	2–3	369	Terraces med
Colonial house small	–	1–2	369	Terraces small
Terraces large	–	3–4	216	Terraces med
Terraces med	–	2–3	76	Terraces small
Terraces small	–	1–2	57	Apartment
Flats large	–	2–3	400	Flats med
Flats med	–	2–3	303	Flats small
Flats small	–	1–2	232	Apartment
Apartment	–	1–2	10	–

2.4.3 Scenario 2: Location Shift to a Denser Neighbourhood

Participants were asked to imagine that they had to move to another neighbourhood, and that the home they would move to was identical to their original home. Each respondent was given ten options, generated by finding the closest set of alternatives based on their current land area and capital value. To model a more populated and dense city of the future, all land areas used to calculate the option set were reduced by 20%. The respondent's property and house size remained unchanged. Ten viable options were highlighted on a map, and the respondent could view each in detail before choosing one. Participants were then asked to rate the selected new neighbourhood on the neighbourhood liveability scale. Participants were also asked to rate their familiarity with their chosen neighbourhood (Fig. 2).

There was a degree of variation in how close each set of alternatives were to the participant's actual property area and capital value, which was based on the distribution of both land area and capital value. Across the sample, 94.3% of participants chose an option that was within 10% either side of their current home price and land area. A ratio for each participant was calculated of their replacement home over their current home. The mean ratio for capital value was 1.00 (SD = .38), and the mean ratio for land area was 1.01 (SD = .40), indicating that on average, replacement homes were almost identical to participants' current homes. Therefore, aside from location, the options presented were comparable to each respondent's current neighbourhood. Participants were also asked to mark where they would choose to live if money was not a limiting factor.

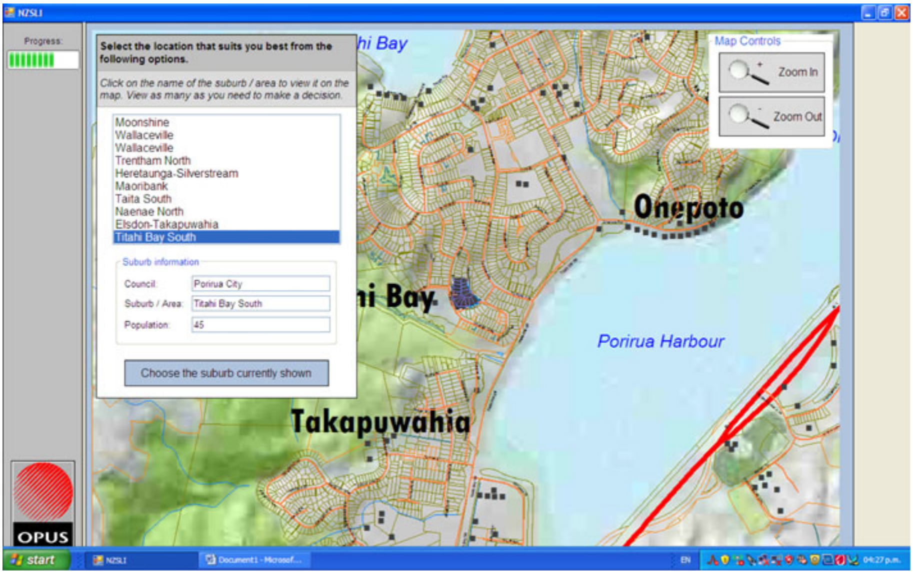


Fig. 2 An example participant view of the neighbourhood selection screen, including the ten available neighbourhood options, a map of the currently selected neighbourhood and the details regarding the population based in that selected neighbourhood

3 Results

3.1 Baseline Home Liveability

Type of residence (colonial home, flat or house), collapsed across home size and residential density, had no significant effect on mean perceptions of home liveability, $F\,(2, 103) = .003$, *n.s*. Home size, collapsed across type of residence and residential density, also had no significant effect on home liveability, $F\,(2, 103) = .33$, *n.s.* Table 4 reports the mean scores on the home liveability scale, split by home type, residential density, and home size. Based on the lack of significance between residence types, and the limited sample numbers for colonial homes ($n = 10$) and flats ($n = 10$), the data collected for respondents living in these resident types (colonial home and flat) were not analysed in the more detailed analyses that follow.

Supporting the theory that people resist describing their actual house choice negatively, there were few differences on the house and neighbourhood characteristic items attributable to house size or neighbourhood density, with only 6 of the 52 comparisons reaching significance (see Table 5). The only significant change across the home liveability characteristics was that the ease of entertaining guests reduced as house size decreased. Impressions that the houses in the neighbourhood were overpriced increased with house size and reduced with density.

3.2 Scenario 1: Replacement Home with Smaller Property Area

Judgements of home liveability significantly decreased when participants were moved from their existing home. The means for all scale items moved significantly in the direction of decreased liveability, as shown in Table 6.

Table 4 Perceived home liveability across characteristics of house type, house size and density

Home characteristics					
Type	Density	Size	*n*	*M*	SD
Colonial	Medium	Large	5	82.09	7.13
		Medium	3	84.19	6.31
		Small	2	92.77	5.82
Flat	Medium	Large	5	83.33	14.26
		Medium	3	80.41	15.52
		Small	2	92.83	0.75
	High	Large	5	93.42	9.94
		Medium	11	81.09	13.94
		Small	9	90.04	7.14
House	Medium	Large	2	92.42	13.22
		Medium	26	84.22	11.93
		Small	22	79.85	20.07
	Low	Large	–	–	–
		Medium	6	92.12	8.97
		Small	5	83.82	4.99

To form a simplified model that revealed the key characteristics that influenced the lower ratings for the densified home, a stepwise linear regression was performed against Home Liveability in the densified condition.[3] The following 15 independent variables examined were entered into the model in this order: Home Liveability (baseline), Income, Age, Gender, Land area (baseline), Lost land area, Density (number of bedrooms/area; baseline), Density (densified), Density loss, Number of residents, Reduction in house size, Education, Ethnicity, Employment, and Children.

The final model had a Multiple-R of 0.60 and explained 33% of the variation ($R^2 = 0.33$) in Home Liveability (densified), F (4, 79) = 11.22, $p < .001$ (see Table 7). Baseline Home Liveability was entered into the model to control for initial variation in liveability prior to densification.

It is perhaps unsurprising that a reduction in house size (typically from a House to a Terraced House, see Table 4) reduces Home Liveability, as aspects of Home Liveability relate to having a large enough home space for entertaining, storage, or daily living. However, there was one counter-intuitive finding within the items making up the Home Liveability scale. When the replacement home was the same house with a smaller land area, the participants still rated the size of their replacement house as significantly less than ideal for their needs (t (62) = 4.99, $p < .001$).

Older home owners are more adaptable to a reduction in land area. This could be partly explained by the fact that as age increases, income (r (100) = −0.64, $p < .001$) and property area (r (100) = −0.22, $p < .05$) decrease, such that older home owners may be looking to downsize at some point in the future anyway.

[3] A repeated-measures general linear model revealed several key factors that influenced changes in home liveability between conditions, so a stepwise linear regression was used to reduce the complexity of the findings.

Table 5 Mean home and neighbourhood liveability characteristic scores and significant differences on ANOVA tests by house size and density

	House size			*F*	Density			*F*
	Large	Medium	Small	(2, 83)	High	Medium	Low	(2, 83)
Home characteristics								
Size of home	5.14	5.04	4.80	0.37	4.99	4.87	5.22	0.32
Space for possessions	4.24	4.66	4.48	0.52	4.40	4.50	5.11	1.56
Ease of entertaining people	8.57	7.27	6.01	5.26**	6.70	6.83	7.25	0.21
Layout for lifestyle	7.87	7.07	7.02	0.47	6.99	7.02	7.82	0.67
Size of lounge	5.13	4.99	4.76	0.38	4.91	4.85	5.18	0.26
Distance to neighbours	3.73	4.06	3.69	0.72	3.94	3.74	4.36	0.88
Size of outdoor living area	5.60	5.10	4.78	1.03	4.80	4.90	5.93	2.51
Noise from neighbours	7.58	6.79	6.25	1.11	7.00	6.27	7.45	1.51
Car parking on-road	7.44	6.08	5.23	1.63	6.60	5.44	5.96	1.04
Privacy	7.27	6.45	6.29	0.50	6.91	6.12	6.93	1.16
Need for additional room	8.43	6.16	6.63	1.68	7.20	6.12	7.06	1.18
Neighbourhood characteristics								
Buildings pleasant to look at	3.57	3.40	3.69	1.15	3.76	3.40	3.64	1.51
Little space between buildings	3.14	3.12	3.00	0.13	3.12	2.92	3.64	2.06
Buildings too tall	4.29	3.79	3.81	1.67	3.96	3.76	3.91	0.78
On-street parking readily available	3.86	3.44	3.11	1.33	3.56	3.28	3.09	0.65
CBD easily reached	4.00	4.21	4.22	0.43	4.20	4.18	4.27	0.11
Occasionally see undesirable people	3.00	2.88	3.11	0.51	3.36	2.80	3.00	2.79
Schools good reputation	3.71	3.86	3.69	0.49	3.68	3.76	4.09	1.17
Anything found in local shops	4.29	3.91	3.92	0.72	4.12	3.86	3.91	0.92
Public transport poor	4.00	4.26	4.00	0.81	4.12	4.10	4.27	0.15
No peace and quiet	4.43	3.74	4.03	3.29*	3.88	3.88	4.18	0.76
Presence of graffiti and unpleasantness	3.71	3.14	3.56	2.11	3.88	3.08	3.45	5.66**
Residents look after neighbourhood	4.43	3.79	3.81	3.09	4.16	3.68	3.91	4.86*
Neighbourhood overpriced	2.43	3.19	3.22	3.32*	2.80	3.22	3.55	4.40*
Neighbourhood restricts lifestyle	4.43	4.05	4.22	1.78	4.08	4.18	4.18	0.26
Convenient access to main activity	4.43	4.35	4.33	0.08	4.28	4.38	4.36	0.26

Items in bold are reverse scored

* $p < .05$, ** $p < .01$, *** $p < .001$

Land area (baseline) was significant in the model, whereas land area (densified) or the amount of loss of land was not significant, suggesting that the size of the reduction is less important than the initial land area that is being reduced. That is, people with greater land to begin with are more amiable to a replacement home with a smaller land area. It is also important to note that this is the case regardless of the number of people within that household.

3.3 Scenario 2: Location Shift to a Denser Neighbourhood

Paired-sample *t*-tests were performed on each of the 15 scale items to determine the effects of a change in location on different measures of liveability, shown in Table 8. Significant

Table 6 Perceived mean home liveability items and scale from a densified living environment

Home characteristic	Baseline		Densified		*t*
	M	SD	*M*	SD	
Size of home	8.58	2.22	6.13	3.30	6.86***
Space for possessions	8.43	2.05	5.83	3.30	7.86***
Ease of entertaining people	6.80	2.37	3.74	2.25	11.42***
Layout for lifestyle	7.06	2.18	3.70	2.33	10.86***
Size of lounge	8.34	2.27	6.90	3.02	4.41***
Distance to neighbours	7.39	2.65	3.87	3.25	10.25***
Size of outdoor living area	8.33	2.58	4.04	3.31	10.81***
Noise from neighbours	6.63	2.39	3.18	2.11	12.03***
Car parking on-road	5.92	3.25	2.79	2.58	10.68***
Privacy	6.61	2.42	2.63	2.03	15.20***
Need for additional room	6.86	2.95	4.57	3.26	6.52***
Overall scale[a]	74.73	13.69	44.48	21.41	14.53***

Lower scores represent lower perceptions of liveability

Items in bold are reverse scored; Italicised items were converted from a different scale anchor type[4]; Overall scale does not include item "car parking on road"

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 7 The significant variables, their beta values and part and partial correlation coefficients in the regression model of home liveability (densified)

	B	SE	Beta	*t*	*p*	Correlations	
						Partial	Part
Land area (baseline)	0.03	0.01	0.24	2.17	0.033	0.24	0.19
Age	3.37	1.50	0.24	2.25	0.027	0.25	0.20
Home liveability (baseline)	0.33	0.16	0.23	2.10	0.038	0.23	0.19
Reduction in house size (1 = No reduction; 2 = Reduction)	−14.05	4.52	−0.33	−3.11	0.003	−0.33	−0.28
Constant	7.58	12.93		0.59	0.560		

differences were found for items relating to transport and lifestyle (e.g. schools and public transport), while no significant differences were found for items relating to social aspects of the neighbourhoods (e.g. residents looking after the neighbourhood, presence of graffiti and undesirable people).

[4] For the purposes of forming an overall scale of Home Liveability participants' scores for certain items were converted from a position where the midpoint of the scale was ideal (e.g. 0 = Neighbours too close, 5 = Ideal distance, 10 = Neighbours too far away) to a scale where the highest number represented the ideal (e.g. 0 = Poor distance for neighbours, 5 = Neutral, 10 = Good distance for neighbours). The conversion was calculated using: $((X - 5) * 2) - 10$ (the absolute value of this score was taken to ensure all scores were positive).

Table 8 Changes in perceived liveability from actual home to location to chosen replacement neighbourhood

Neighbourhood characteristic	Baseline		Replacement		*t* (105)
	M	SD	*M*	SD	
Buildings pleasant to look at	2.54	0.91	2.42	0.81	1.14
Little space between buildings	2.96	1.06	2.9	1.02	0.53
Buildings too tall	2.12	0.64	2.25	0.65	−1.60
On-street parking readily available	3.34	1.3	3.08	1.06	1.58
CBD easily reached	4.24	0.58	3.55	1.01	5.92***
Occasionally see undesirable people	3.08	1.02	3	0.85	0.67
Schools good reputation	3.74	0.82	3.54	0.68	2.02*
Anything found in local shops	3.98	0.78	3.36	0.96	6.54***
Public transport poor	1.88	0.9	2.42	0.83	−4.87***
No peace and quiet	2.13	0.82	2.48	0.73	−3.16**
Presence of graffiti and unpleasantness	2.67	1.06	2.73	0.93	−0.50
Residents look after neighbourhood	3.75	0.74	3.68	0.7	0.80
Neighbourhood overpriced	2.91	0.79	3.13	0.73	−2.60*
Neighbourhood restricts lifestyle	1.89	0.62	2.66	1.07	−6.29***
Convenient access to main activity	4.35	0.55	3.43	1.1	7.63***

* $p < .05$, ** $p < .01$, *** $p < .001$

There was also greater agreement that the new neighbourhood was overpriced, even though the average capital value of houses in the new neighbourhood did not differ significantly from the baseline neighbourhood (t (105) = 0.67, $p > .05$).

3.3.1 The Importance of Distance to Location Choices

The distance analysis aimed to determine whether participants selected a replacement neighbourhood based on the distance of that neighbourhood to their main weekly destinations. The geo-coordinates of participant's three main weekly destinations (work, partner's work, an important 'other' location) formed a triangle of various dimensions, depending on the spatial relationships of the locations. The mid-point of this triangle was calculated by averaging the geo-coordinates of the three locations to produce a proxy measure of the optimal location that a participant would live if distance was the primary concern. For each participant, the shortest path via road was calculated between each of the ten alternative neighbourhoods and the best alternative neighbourhood location was calculated for each participant (see Table 9).

4 Discussion

The findings indicate that individuals typically optimize their housing type and location and a reduction in house size or a shift to a denser neighbourhood are perceived to negatively impact on their lifestyle.

Table 9 Descriptive statistics for distances via road between actual, replacement and best alternative neighbourhood location and key destinations

	Average distance from neighbourhood (km)					
	Actual		Selected replacement		Best alternative	
Destination type	Mean	SD	Mean	SD	Mean	SD
Main activity	6.84	7.14	16.07	15.18	13.21	11.44
Partner's main activity	4.48	5.41	15.79	15.26	12.20	11.69
Other activity	5.22	7.44	16.04	15.27	12.01	12.01
Ideal	10.58	11.77	15.96	16.57		
Chosen	16.17	14.97				

4.1 Baseline Liveability

Judgements of an individual's current home liveability (the baseline condition) are typically positive, a finding which replicates and externally validates previous findings of high liveability in another New Zealand city (Auckland) using the same liveability measures (see Walton et al. 2008). The positive home liveability finding suggests that either most people choose a home that it is suitable for their needs or that there is a cognitive response bias, such that people will always rate something that they have actively chosen more positively (e.g. Losciuto and Perloff 1967; Gilovich et al. 1995).

Despite an underlying desire for spacious living and a trend towards larger living spaces (e.g. Wilson and Boehland 2005) the only perceived benefits of a larger house size are that it provides additional room for entertaining guests and more peace and quiet. Home owners did not differ in their ratings of factors directly relating to size, that is, the size of the home, the size of the lounge, and the amount of storage space for possessions, regardless of the initial house size (small, medium or large). The lack of sensitivity to actual house size could reflect that the homes people choose are tailored to their spatial requirements. Alternatively, this could be further evidence of a positive response bias when rating one's own home.

4.2 Scenario 1: Replacement Home with Smaller Land Area

Perceived home liveability is significantly lower (across all 11 home liveability characteristics) for the smaller replacement home when compared with original (baseline) home (supporting Hypothesis one). The general negative reaction occurs across all home liveability characteristics, even when there has been no change. For example, those participants that have a reduction in overall land area (i.e. a smaller outdoor area), but where their house size does not alter, still report a reduction in the internal space in the home.

Evidence suggests that participants do understand the experimental manipulation, that is, they understood whether their house had been reduced in size. Therefore, the consistent negative subjective response across all of the home liveability characteristics could be a "halo effect" (see Nisbett and Wilson 1977), where a decrease in satisfaction with the reduction in land area spreads to perceptions of dissatisfaction with unrelated characteristics of home liveability. The seemingly irrational loss aversion could be a function of Prospect Theory (Tversky and Kahneman 1991), where people attempt to maintain what they have, even if the good is redundant to their lifestyle.

Initial land area is a greater predictor of home liveability scores for the replacement home than the relative amount of land lost. Therefore, people with larger properties and houses to begin with can afford to lose more space before it impacts adversely on their lifestyle. People with larger properties, living in low-density neighbourhoods could be shifted to medium density properties more easily than a shift from medium to high density properties. However, even if the benefits of a smaller property, such as closer amenities, are clearly outlined it is unlikely that larger home owners will actively reduce their property size voluntarily. Any shift in purchase behaviour is working against an adverse reaction to property loss.

Older home owners are more tolerant of a denser home living situation, which may be related to the fact that home owners typically reduce their property size when they get older. For example, large, high-maintenance outdoor areas may become a burden to some older home owners. Therefore, older age groups are more open to a densified lifestyle. Consideration of the needs of older age groups in high-density urban living should be given greater priority, as there are obvious collateral benefits to this group in terms of access to public transport, medical facilities, shopping and other key infrastructure (e.g. see Fobker and Grotz 2006). However, evidence suggests that elderly residents are likely to age in place, with very little location shift even if they are dissatisfied (e.g. Perez et al. 2001). If taken from a policy perspective aimed at densification, the key element is to make a shift attractive by pointing out that any loss is redundant, whereas the potential lifestyle gain is quite tangible.

4.3 Scenario 2: Location Shift to a Denser Neighbourhood

When home owners' houses are relocated to a space with the same land area (and a similar land value) within a neighbourhood that is 20% denser the perceived neighbourhood liveability of the new neighbourhood is significantly worse relative to their actual (baseline) neighbourhood (supporting hypothesis 2). The negative response occurs even though participants are given the choice from ten new neighbourhood locations within the region.

The specific neighbourhood characteristics that decrease in the selected neighbourhood (relative to the baseline neighbourhood) typically relate to access. Home owners perceive that the selected neighbourhood has poor access to their main activity (typically the workplace), the central business district, and key infrastructure, including reputable schools, good shopping facilities, and frequent public transport services. The level of peace and quiet was also viewed to reduce in the new neighbourhood. Howley et al. (2009b) also found that one of the deterrents of higher density living was the heavier noise levels.

Perhaps more important than the factors which are perceived to reduce neighbourhood liveability are the factors that participants chose to preserve when they selected the new neighbourhood. The shift to a selected neighbourhood does not affect judgements of typical factors associated with higher density living, such as building height or opportunity for parking. Similarly, social factors (such as the type of residents and presence of graffiti) do not alter in the selected neighbourhood, even though other research suggests that social factors are typically rated poorly by residents of higher density neighbourhoods (e.g. Bramley et al. 2009).

When given the opportunity to shift, people trade access to key infrastructure and increase distances to common travel locations in order to move to a neighbourhood where the buildings are aesthetically pleasing, there is opportunity for parking, and perhaps more importantly, the social factors are similar to their actual (baseline) neighbourhood. An alternative explanation is that people simply do not have enough evidence to make a reasonable comparison to the social factors influencing other neighbourhoods, whereas they are well aware of the more tangible factors, such as travel distances (see Carter and Gilovich 2010).

Bramley et al. (2009) found that social interaction and community connectedness are more common in medium density neighbourhoods, whereas the use of local amenities is greater in high-density locations. Ge and Hokao (2006) compared Saga City (a relatively spread out city) and Kitakyushu City (a relatively dense city) in Japan, and found that safety, personal security and a clean, beautiful environment were the most important facets of a lower density city, and house area and number of rooms were seen as most important in the higher density city. Howley et al. (2009b) also note a reduction in community involvement in high density neighbourhoods. The theory of Social Capital suggests that there is an added value that arises from building connections to the people in a neighbourhood, including a higher level of security and trust (Kleinhans 2009).

Even though the capital values of houses within the new neighbourhood are no different, the new neighbourhood is perceived to be overpriced. This could reflect an attitude that higher density housing is typically overpriced. Alternatively, it could reflect an attitude that a participant's own neighbourhood has greater value than is represented in a capital value assessment. There are a range of factors that add perceived value to a neighbourhood and act as barriers to residential mobility, including neighbourhood attachment (Bonaiuto et al. 1999) and neighbourhood reputation (Permentier et al. 2009). That people choose to place additional value on their current neighbourhood is potentially further evidence that less tangible factors, such as social connectedness and neighbourhood pride, are important to residential satisfaction.

4.4 The Importance of Distance to Location Choices

The average objective distance to key travel locations increases in the selected neighbourhood (which does not support hypothesis 3). Denser neighbourhoods are typically associated with closer distances to key locations and amenities (e.g. Banister et al. 1997), but this is not the case with the selected neighbourhood. In fact, the actual (baseline) neighbourhood choice is closer than any of the ten options available. People chose to minimise the distance between where they live and their key travel locations. The other view is that people choose workplaces and key shopping locations that are close to their neighbourhoods. Either way people are making sustainable choices regarding their travel behaviour.

4.5 Conclusion

People's actual liveability choices optimise distance to key travel locations, such as workplaces. When given the choice to relocate to a range of different neighbourhoods, people trade closer travel distances in order to maintain a friendly, safe, clean neighbourhood environment. After economic (i.e. land value) and social (i.e. crime and social interaction) restrictions have been taken into account, home-owners optimise their neighbourhood location relative to their key activities. There is also evidence that home-owners are loss-averse when it comes to densification, but older home owners and those with larger homes have relatively fewer barriers to land area reduction. Urban policy, design interventions and further research could examine densification incentives for these groups more closely.

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