Micro-geography and public housing tenant wellbeing

Motu economic & public policy research

Arthur Grimes, Conal Smith, Kimberley O'Sullivan,
Philippa Howden-Chapman, Lydia Le Gros,
Rachel Kowalchuk Dohig

September 2023

Document information

Author contact details

Arthur Grimes
Motu Research; and Victoria University of Wellington
arthur.grimes@motu.org.nz

Conal Smith
Kōtātā Insight
conal.smith@kotatainsight.co.nz

Kimberley O'Sullivan
University of Otago
kimberley.osullivan@otago.ac.nz

Philippa Howden-Chapman
University of Otago
philippa.howden-chapman@otago.ac.nz

Lydia Le Gros
University of Otago
lydia.legros@otago.ac.nz

Rachel Kowalchuk Dohig
University of Otago
rachel.dohig@postgrad.otago.ac.nz

Motu Economic and Public Policy Research

PO Box 24390   info@motu.org.nz   +64 4 9394250

Wellington   www.motu.org.nz

New Zealand

Abstract

The micro-geography of people's wellbeing depends on house and neighbourhood characteristics. We show that the form of tenancy is also important. Identical people in identical settings may have different wellbeing outcomes depending on their security of housing tenure. Our findings utilise a survey administered to residents in public rental housing, private rentals and owner-occupiers in New Zealand, focusing on the capital city, Wellington. Despite selection effects which are likely to bias findings against higher wellbeing for public housing tenants, we find that public tenants have higher subjective wellbeing (WHO-5 and Life satisfaction) than do private tenants, and similar wellbeing to owner-occupiers. Length of tenure helps to explain wellbeing differences between public and private tenants, likely reflecting New Zealand law under which private renters have insecure tenure (relative to many overseas jurisdictions). We find also that wellbeing is associated with residents' perceptions of house suitability and neighbourhood suitability. House suitability reflects house quality, condition, cold and dampness. Neighbourhood suitability reflects the importance of social capital and of living in a safe area. Some characteristics are more important for certain population groups than for others; hence analysts should be wary of generalising about relationships between micro-geographic factors and wellbeing.

JEL codes

I31, I38, R23, R28, R38

Keywords

Public housing, tenant wellbeing, house quality, neighbourhood characteristics

Summary haiku

Secure, quality

public housing tenancies

Wellbeing is high

Contents

Executive summary

One component of the MBIE-funded Endeavour research programme, *Public housing and urban regeneration: Maximising wellbeing*, comprises a survey of public housing tenants, owner-occupiers and tenants in private housing about their housing circumstances. Public housing in this study includes housing provided by central government (through Kāinga Ora - Homes and Communities), local government, and Community Housing Providers (CHPs). This paper reports results, derived from these survey responses, relating to the wellbeing of public housing tenants including how their wellbeing compares with residents in other forms of housing tenure.

Survey responses were received from residents in multiple cities, but our analysis here is confined to respondents from within the Wellington urban area (specifically Wellington and Porirua Cities) to ensure that results are not affected by inter-city differences.

We address three main questions: First, is public housing associated with higher tenant wellbeing relative to other forms of tenure (private rental and owner-occupation)? Second, does the relationship between tenant wellbeing and the type of housing tenure differ by tenant characteristics? Third, which aspects of the house and of the neighbourhood are most strongly associated with the wellbeing of tenants, particularly for those in public housing?

Our focus on wellbeing is important since public housing tenants (by virtue of public housing eligibility criteria) on average face greater disadvantage than do private sector tenants or homeowners. The disadvantages faced by public housing tenants, coupled with the key role of housing in supporting wellbeing, makes an understanding of how public housing contributes to tenant wellbeing of considerable policy importance. Furthermore, understanding the contributions to wellbeing of the specific features of the house and of the neighbourhood in which the house is situated is important when making decisions with respect to future public housing developments.

Our survey includes five separate measures relating to subjective wellbeing of residents, with the main focus being on the WHO-5 mental wellbeing scale and on an evaluative measure of life satisfaction. Three other wellbeing metrics relate to whānau wellbeing, perceived control over one's life, and loneliness. Additional survey data relates to tenant characteristics and to house and neighbourhood characteristics. Most questions are drawn from Stats NZ surveys to ensure comparability with data obtainable from official surveys.

Our analysis produces four major findings.

First, despite many public housing tenants having had to face considerable life challenges prior to entering public housing, we find that public housing tenants have higher wellbeing, on average, than do private tenants. Furthermore, their wellbeing is at a similar level, on average, to that of owner-occupiers. These results hold despite household incomes being much lower for public housing tenants than for either private tenants or owner-occupiers. Some public housing providers offer income-related rents, while some are not eligible to do so. The wellbeing advantages of public housing still hold for providers who are not eligible for the income-related rent subsidy.

Second, as length of tenure increases, the divergence in wellbeing between public and private renters diminishes. Wellbeing declines gradually as public housing tenants increase their length of tenure, potentially reflecting an initial upward bump in wellbeing when they first move into their new house. By contrast, wellbeing increases for private tenants as their length of tenure increases, potentially indicating a positive wellbeing payoff for increased security of tenure. This finding implies that laws which increase security of tenure for private tenants (as exist in many jurisdictions in Europe) may have an important wellbeing impact for private tenants.

Third, house and neighbourhood suitability are both strongly associated with residents' wellbeing. Relevant factors affecting perceived house suitability and quality include dwelling condition, cold, and dampness. Perceived neighbourhood suitability is strongly associated with neighbourhood safety and with the presence of high social capital, exhibited through features such as strong local networks.

Fourth, the importance for wellbeing of certain factors (especially dwelling condition) varies across population groups. We find that good dwelling condition is particularly important for Māori tenants, reflecting the cultural importance placed by Māori on hospitality and their visitors being comfortable in the host's home.

1: Introduction

Housing is identified as one of three major areas of concern for the wellbeing of residents by New Zealand's Treasury (The Treasury, 2022). A shortfall of affordable quality housing in Aotearoa New Zealand[1] has led to a cascade of housing-related issues with associated poor wellbeing outcomes. Historically, housing quality in New Zealand has been poor (Howden-Chapman, Crane, et al., 2023). Despite this poor quality, New Zealand is ranked 40th of 41 countries in the OECD's Better Life Index according to housing affordability.[2] The high cost of housing, coupled with the poor quality private rental stock, has added to the demand for public (including social and community) housing.[3] Eligible households in most forms of public housing receive a subsidised rent through the Income-Related Rent Subsidy (IRRS), resulting in lower rents for a similar house than would be paid by the same tenant if they were in private rental. Public housing also has greater security of tenure than is the case for private rentals.

We examine tenant wellbeing outcomes that are associated with being in public housing relative to other forms of tenure. Placement in public housing means that the tenant experiences a different form of tenure (public rental), a different house and potentially a different neighbourhood when they move in. They may also pay a lower rent than if they were in private tenure.

We address three main questions: First, is public housing associated with higher tenant wellbeing relative to other forms of tenure (private rental and owner-occupation)? Second, does the relationship between tenant wellbeing and the type of housing tenure differ by tenant characteristics? Third, which aspects of the house and of the neighbourhood are most strongly associated with the wellbeing of tenants, particularly for those in public housing? This third question relates to the 'micro-geography' of wellbeing in which the focus has commonly been on local aspects that may affect people's wellbeing (as opposed to a focus on regional or urban area characteristics). Our analysis indicates that consideration of micro-geographic factors should incorporate not just house and neighbourhood characteristics but also the form of tenure experienced by residents.

---

[1] The country is sometimes referred to as Aotearoa or as Aotearoa New Zealand; for simplicity, we henceforth refer to the official name, New Zealand.

[2] Furthermore, New Zealand has the highest ratio of housing costs (including utility expenses) to gross adjusted disposable income of all OECD countries (as at 16 September 2023); see: https://www.oecdbetterlifeindex.org/topics/housing/.

[3] Henceforth we refer to all forms of public, social and community housing simply as public housing.

The micro-geography of wellbeing within city neighbourhoods is receiving increased attention internationally (Kourtit et al., 2021). Both the physical 'body' of neighbourhoods and the personal experiences ('soul') of residents are important in analysing these micro features; relevant considerations include social capital, inclusiveness, cultural identity and sustainability factors. When dealing with these micro-geographic features, researchers must define what they mean by 'neighbourhood' or 'community' as this choice is important in framing the analysis. In this paper, our main focus is on public housing residents within the Wellington urban area, with comparisons to private renters and owner-occupiers in the same area. Population of the Wellington urban area (as at the 2018 census) was 414,033, with almost all our Wellington sample being drawn from two local authorities (Wellington City and Porirua City) having a combined 2018 population of 265,983.

Considerable research has been conducted within New Zealand on the effects of housing quality on health and wellbeing (for a comprehensive summary, see Howden-Chapman, Crane, et al., 2023). However, there is considerably less evidence on the specific relationship of public housing to wellbeing. One previous New Zealand study looked at specific health impacts of public housing tenants in relation to the tenure mix of their immediate neighbourhood, finding that the majority of public housing tenants are living in neighbourhoods with low proportions of public housing (Chisholm et al., 2022). Where a (Stats NZ defined) 'meshblock' houses a median of 89 people, 70% of public housing tenants live in a meshblock where 50% or less of the population live in public housing. Only 11% live in a meshblock where 80% of people live in public housing. Looking to a larger neighbourhood size, only 0.1% of individuals living in public housing live in census area units (median 1,863 people) where over 65% live in public housing. The study showed that as the proportion of public housing tenants in the local area increases, hospitalisation, mental health outpatient service use, and prescriptions received decreases, although this was mostly reversed in very high densities of public housing (Chisholm et al., 2022).

Our focus on wellbeing is particularly important since public housing tenants (by virtue of public housing eligibility criteria, outlined further below) on average face greater disadvantage than do private sector tenants or homeowners.[4] The disadvantages faced by public housing tenants, coupled with the key role of housing in supporting wellbeing, makes an understanding of how public housing can contribute to tenant wellbeing of considerable importance. In this context,

---

[4] Grimes and White (2019), for instance, find that public housing tenants had the lowest rate of internet connectivity of all population groups that they examined.

understanding the contributions to wellbeing of the specific features of the house and of the neighbourhood in which the house is situated is important when making decisions with respect to future public housing development.

Our research forms part of a larger research programme that is designed to improve the wellbeing of public housing tenants and their communities by providing evidence that leads to healthier and more environmentally sustainable development.[5] Evidence gathering includes data obtained both from surveying tenants with six different public housing providers and from private tenants and owner-occupiers in houses near public housing developments. The surveyed sites are spread across three separate urban areas, the majority of which are in the Wellington urban area. The comparison data for private renters and owner-occupiers are obtained from houses in one neighbourhood in the Wellington urban area which sampled all dwellings within a walkable distance of a few housing blocks geographically-bound by a park and a main road.

Much of our analysis is confined to the Wellington area sample to reduce potential confounding influences of variations across urban areas. The other public housing included in the Wellington sample consists of three larger apartment blocks, five smaller public housing apartments or townhouse developments, and stand-alone public housing dwellings within Wellington city. Our survey includes five separate measures relating to subjective wellbeing with the main focus in this study being on the WHO-5 mental wellbeing scale and on an evaluative measure of life satisfaction. Other survey data relate to tenant characteristics and to house and neighbourhood characteristics. By focusing our analysis on the house and neighbourhood levels, we contribute insights that relate to the micro-geography of the community, complementing analyses of public housing impacts that have been conducted at larger scales within New Zealand (Chisholm et al., 2022; Anastasiadis et al., 2018; Smith and Davies, 2020).

Section 2 of the paper presents background materials on public housing in New Zealand and on related studies. Section 3 outlines the survey on which our analysis is based plus details of data collection, while section 4 provides key descriptive statistics. Section 5 presents empirical results with respect to our three research questions. Key findings include: (i) despite selection issues, public housing tenants have higher wellbeing than do private tenants; (ii) as length of tenure increases, this divergence in wellbeing between public and private renters diminishes (possibly reflecting New Zealand tenancy laws that do not provide security of tenure in private rentals);

---

[5] *Public housing: Maximising wellbeing and urban regeneration,* https://www.sustainablecities.org.nz/our-research/current-research/public-housing-urban-regeneration-programme.

(iii) house and neighbourhood suitability are both strongly associated with residents' wellbeing; relevant factors include: dwelling condition, cold, dampness, neighbourhood safety and social capital; and (iv) the importance for wellbeing of certain factors (especially dwelling condition) varies across population groups. Section 6 provides concluding observations based on these findings.

2: Background

The number of public housing dwellings in New Zealand has increased substantially in recent years. The largest provider of public housing, Kāinga Ora - Homes and Communities[6], a public entity, increased its managed housing stock from 67,041 in March 2016 to 70,649 in March 2023, a 5.4% increase[7] (which compares with a 10.3% increase in the country's population over the same period). The total public housing stock across all providers (including local councils and non-governmental organisations) stood at 78,064 in March 2023 (MHUD, 2023), constituting 3.8% of the country's total private dwelling stock.[8] This is much lower than some OECD countries including the Netherlands, Denmark and Austria where public housing makes up over 20% of all dwellings, and the United Kingdom, France, Ireland, Iceland and Finland where social housing comprises 10% to 19% of the total housing stock. The average proportion of social housing stock, in both OECD and non-OECD European countries, is around 6% of the total housing stock.[9] In New Zealand, there remains a significant shortfall in both the affordable and public housing sectors. The 'Housing Register' (the official waiting list for public housing for those assessed as having 'serious' housing needs and who are eligible for public housing but who have yet to be placed), stood at 24,080 in March 2023. The number of households officially assessed as being in serious housing need equated to 1.1% of the total housing stock, or 31% of the public housing stock.

A consequence of the housing market structure in New Zealand has been increased levels of household crowding in multi-family households, little or no reduction in high levels of homelessness and reliance on short-term emergency and transitional housing, with major

---

[6] Henceforth referred to as Kāinga Ora. Kāinga Ora, established in 2019 as a Crown Agency, was formerly known as Housing New Zealand Corporation (HNZ), also a public entity.

[7] March 2016 is the earliest available comparable data provided by Kāinga Ora. See: https://kaingaora.govt.nz/publications/oia-and-proactive-releases/housing-statistics/.

[8] The private dwelling stock was estimated by Statistics NZ as 2,209,400 as at December 2022. Private dwellings include public housing and also include temporary dwellings such as caravans that normally house at least one person: https://www.stats.govt.nz/information-releases/dwelling-and-household-estimates-december-2022-quarter/#:~:text=Key%20facts,households%20estimate%20%E2%80%93%201%2C953%2C900.

[9] See: https://www.oecd.org/social/social-housing-policy-brief-2020.pdf

consequences for wellbeing (Howden-Chapman et al., 2021). This is particularly evident in Māori and Pacific households[10] where the decline in homeownership has resulted in these populations bearing the brunt of housing-related problems. The Māori homelessness rate is four times the New Zealand European/Pākehā rate (Amore, et al., 2021; Lawson-Te Aho et al., 2019). Due to the selection criteria for public housing, and the disproportionate burden of homelessness and housing insecurity borne by Māori, Māori are overrepresented as public housing tenants making consideration of public housing, and its wellbeing implications, of particular relevance to this community.

Many public housing tenants face multiple forms of deprivation reflecting the process of selection into public housing. In June 2022 (as our survey was about to enter the field), the Ministry of Social Development (MSD) outlined the requirements for people to be allocated public housing (MSD, 2022). Each public housing applicant is given a priority rating based on the Ministry's assessment of housing need. Those who are most in need ("at risk") are categorised as Priority A, while those in "serious housing need" are categorised as Priority B. The priorities are determined according to the Social Allocation System (SAS) based on five criteria which are each rated on a score of one to four, with the maximum score of 20 being for those most in need. The five official criteria are: (i) **Adequacy**, including not currently in accommodation or in emergency housing, having accommodation which lacks basic facilities or is over-crowded, or for which there is lack of secure tenure. (ii) **Suitability**, including medical, disability or personal needs, family or neighbourhood violence, and incapacity to rent in the private market. (iii) **Affordability**, based on inability to afford accommodation in the private market. (iv) **Accessibility**, including inability to access and afford private accommodation, potentially influenced by discrimination or lack of financial means to move. (v) **Sustainability**, focusing on financial management difficulties, social functioning and social skills. These criteria acknowledge that in addition to health, social and economic needs which may prevent someone from achieving housing through the market, there is also a level of confidence, skills, and knowledge necessary for navigating the housing system to obtain other housing options.

The detailed questions in our tenancy survey cover some of these aspects (e.g. housing condition, neighbourhood characteristics including perceptions of safety, material standard of living, and perceived discrimination) but we are unable to control for other factors. These

---

[10] Māori are the indigenous population of New Zealand; Pacific peoples (often referred to as 'Pasifika') refers to people who identify their ethnicity as being from the Pacific Islands (e.g. Cook Islands, Niue, Tokelau, Samoa, Tonga, Fiji, Tuvalu) including those who may be born in New Zealand. We henceforth use the term 'Pacific' to refer to these people.

omitted factors include personal details such as family violence and degree of social functioning. The omitted factors are likely to be correlated negatively with measures of wellbeing; for instance, a person subject to family violence or who has lower social functioning can be expected to record lower subjective wellbeing than does a person unaffected by these issues but who has otherwise similar observable characteristics.[11] Given that these unobservable factors both increase the likelihood that a person receives a public housing place and reduce an individual's wellbeing, their omission is likely to bias any statistical relationship between wellbeing and housing tenure against finding a positive association between subjective wellbeing and public housing (relative to other forms of tenure).

Anastasiadis et al. (2018) attempt to control for such unobservable effects in their study of the wellbeing effects of placement into public housing. They combine HNZ data on successful public housing applications with data on people surveyed by Stats NZ in the (biannual 2008 to 2014) New Zealand General Social Survey (NZGSS). The study identifies survey respondents who were interviewed either in the 15 months prior to placement in an HNZ house (the 'Before' group) or in the 12 months after placement (the 'After' group). All people in the sample were therefore chosen on the basis that they were successfully placed in an HNZ dwelling either before or after their participation in the NZGSS. Sample size for the After group was 84 compared with 48 for the Before group. (Differences in sample size may reflect the greater ease of sampling NZGSS respondents once people were placed in public housing; in addition, sampling issues may have affected sample composition with the Before and After samples differing, most notably according to age.)

The analysis compared After versus Before group outcomes across several measures of house quality and across multiple wellbeing indicators, including overall life satisfaction (measured on a 5-point scale). With respect to house quality, the analysis found that after public housing placement, there was a significant reduction in experiences of mouldy housing, crowded housing, and housing which is in poor condition. Accordingly, the After group was less likely to report dissatisfaction with their house. This indicates that the public housing stock was of better quality than these persons' previous dwellings, at least according to self-report. No difference was found in terms of house temperature between the Before and After groups, potentially reflecting income constraints that affect low-income households' use of heating appliances.

---

[11] See Dolan et al. (2008) for a comprehensive summary of evidence on determinants of personal wellbeing.

With respect to wellbeing, the study found that the After group were less likely to record not having enough free time but were more likely to record feeling unsafe walking in their neighbourhood at night. Life satisfaction improved, with 25% of the After group recording low life satisfaction (defined as 1-3 on the 1-5 scale) compared with 44% for the Before group (the difference in means is significant at p=0.053). After controlling for compositional differences, life satisfaction for the After group had a point estimate that was 0.41 points higher than for the Before group (p<0.05). Thus, despite relatively small samples, the evidence from the study showed that placement in public housing resulted in higher overall wellbeing coupled with generally better housing quality outcomes.

Smith and Davies (2020) also examine wellbeing outcomes for Kāinga Ora tenants. They estimate the association of housing-related outcomes with life satisfaction, both for the full NZGSS sample and for a sub-sample comprising Kāinga Ora tenants. (No comparison is made just with private tenants, with the full sample being numerically dominated by homeowners.) Kāinga Ora tenants are not differentiated according to whether they have been recently assigned a house or are long-standing public housing tenants. Key findings with respect to the full sample relevant to our study include that life satisfaction is negatively associated with poor house condition, mould and cold.[12] In addition, the paper indicates a strong positive association between self-assessed mental health and life satisfaction. For the much smaller Kāinga Ora sample, the evidence again indicates that a cold house is negatively associated with life satisfaction while the point estimates for house condition and mental health are consistent with those for the full sample.

Kāinga Ora tenants and tenants with some other public housing providers receive subsidised rents (relative to market) through the Income Related Rent Subsidy (IRRS) programme. Under this programme, a tenant's rent is capped at 25% of their net income up to the level of the New Zealand Superannuation (pension) rate, and at 50% of income over that amount (Hyslop and Rea, 2019). New Zealand has a second form of housing assistance, Accommodation Supplement (AS), a cash payment for eligible people who do not receive the IRRS. Eligibility for AS depends on several factors including: (low) income, housing costs, family size, housing tenure type and location. Currently, approximately 11% of the population receives AS (Hyslop and Rea, 2019). Exploiting a natural experiment that involved AS changes and changes in locational boundaries for certain AS thresholds, Hyslop and Rea estimated that approximately one-third of an AS increase is reaped by the landlord through increased rent with two-thirds being retained by the

---

[12] The impact of dampness, which has been shown to have an independent effect (Riggs et al., 2021) was not assessed.

AS recipient. A subsequent study (Majid, 2023) finds that AS receipt has no effect on rents so effectively constitutes a negative income tax for recipients, who retain the full benefit of the payment.

In the UK, Fujiwara (2013) conducted a similar study to that of Smith and Davies, using British Household Panel Survey (BHPS) data, distinguishing between respondents who lived in different tenancy types [homeowner, shared ownership, sheltered accommodation, Housing Association (HA), local authority, and private rental]. Housing-related factors that are estimated to impact negatively on life satisfaction include: neighbour noise, dampness, poor lighting, no garden, condensation, rot and local vandalism. For those in London, living in HA tenancy is estimated to increase life satisfaction relative to being in a private rental, which Fujiwara conjectures may be due to lower rents in HA accommodation and/or to "a sense of stability offered by HA homes".

Other studies show that public housing tenants often have a strong sense of place, exhibiting pride in their local community (Chisholm et al., 2023). Beyond personal characteristics, factors that determine this positive sense of place include residential satisfaction and housing conditions, social ties, a sense of safety, neighbourhood amenities, estate design, and length of residence.

Our study incorporates many of the factors discussed in these prior studies that may be relevant to public housing tenants' wellbeing. Specifically, we examine relationships of wellbeing with tenant, house and neighbourhood characteristics, the presence of rental subsidies, tenure type and stability of tenure.

3: Survey and data collection

A survey comprising 74 questions (plus a number of sub-questions) addressed to adult residents was used at each site to gather evidence from residents.[13] Questions in the survey were chosen with input from Māori and Pacific researchers to ensure that questions were relevant to two major population groups who are heavily represented in public housing settings. Many of the survey questions are drawn from the official Stats NZ NZGSS (and from the related Māori social survey, Te Kupenga) ensuring that the question items used have an extensive track record of use

---

[13] The full survey can be accessed at: https://www.sustainablecities.org.nz/our-research/current-research/public-housing-urban-regeneration-programme/tenant-wellbeing-survey.

with the New Zealand population and enabling comparison with outcomes for a broader set of public and private tenants and homeowners.

The survey's wellbeing questions include a subjective wellbeing (SWB) question based on life satisfaction (which is classed by OECD (2011) as a measure of evaluative subjective wellbeing), the WHO-5 set of questions on mental wellbeing (that relate to feelings of cheerfulness, calmness, activity, rest and interest), a "eudaimonic" wellbeing question (which relates to perceived control over one's life), and a question on loneliness. It also includes a question on whānau (wider family) wellbeing, which was first introduced by Stats NZ in its Te Kupenga survey following consultation with Māori over appropriate measures of wellbeing from a Māori perspective. Each of these measures is a potential outcome variable when considering tenant wellbeing. Inclusion of the evaluative wellbeing question potentially enables estimates of WELLBYs (wellbeing years) associated with various public housing factors (Frijters and Krekel, 2021).

Tenant characteristics include: age, ethnicity, gender, income, length of existing tenancy, educational qualifications and employment status. The personal, house and neighbourhood domains associated with wellbeing cover tenant views on: house quality, energy use, transport, neighbourhood and community, social capital, health, cultural attachment, spirituality, discrimination and trust. These domains reflect common lists of desirable capabilities (Sen, 1999).

Questions that relate specifically to house quality cover issues of: dwelling condition, cold, mould, dampness, excess heat, pride in the house and how well the house meets the tenant's needs. These questions have been chosen to reflect key findings in the literature on shortcomings of housing in the New Zealand context (Howden-Chapman, Crane, et al., 2023).

The questions included across other domains reflect factors that interact with housing to affect the wellbeing of residents. In particular, questions were chosen to reflect aspects that may be important for public housing tenants either because of their disadvantaged economic position or because of the substantial proportions of Māori and Pacific tenants in public housing. For instance, we include questions on discrimination faced by the tenant, aspects of Māori culture and aspects of spirituality that may be particularly important for Pacific peoples.

Survey participants were public housing tenants of Tamaki Regeneration Company, Wellington City Council[14], Ōtautahi Community Housing Trust, Salvation Army Social Housing, and Dwell. To include tenants of government public housing provider, Kāinga Ora, we targeted two areas using addresses obtained from the New Zealand Post register of postal addresses. One area contained a specific medium density development in central Wellington. An area of Eastern Porirua, a suburb within the Wellington urban area, was also surveyed as it has a high number of public housing dwellings. In this area, the survey included a question to determine the form of housing tenure, and respondents were then classified as public housing tenants of Kāinga Ora, or private rental sector tenants or owner-occupiers. In each of the latter cases, it is likely that some residents occupied homes that were formerly owned by Kāinga Ora but which had been sold by a previous government (Bergstrom et al., 2014).[15] Stated inclusion criteria on the survey form were that participants had to reside at the listed address and be aged 18 years or over.

To collect the data, we undertook a postal survey, with mixed-mode response options. As we worked in collaboration with six different public housing providers to approach participants, we had a standard protocol based on the Tailored Design Method, altered to allow the initial approach of participants by housing providers to introduce the research team and survey without breaching privacy legislation (Dillman et al., 2009; O'Sullivan et al., 2013). Additional details of the survey methodology and response rates are included in Appendix 1.

4: Descriptive statistics

Our full sample comprises 575 respondents (after removal of 17 responses deemed to be unreliable). In the wellbeing analysis that follows, we report responses from five wellbeing questions (used as dependent variables) and incorporate responses from 64 questions used as explanatory variables (with most being grouped, as discussed below, into 11 principal components). Four of the five wellbeing variables had response rates (of those who returned the survey) of over 95%, while the fifth, the WHO-5 mental wellbeing scale, had a response rate of 94.3%. Of the 64 questions used to form the explanatory variables, 56 had response rates of greater than 95%, four had response rates of 90-95% and three (including household income[16])

---

[14] Rebranded as *Te Toi Mahana (the place of caring and nurturing, standing and belonging)* from 1 August 2023 to reflect the transition from rental housing provided by the Wellington City Council to becoming a separate Community Housing Provider providing public housing, with new tenancies eligible for government-funded Income Related Rent subsidies.
[15] Of the listed providers, we include Wellington City Council, Dwell and Kāinga Ora as being located in Wellington (together with the surveyed owner occupiers and private sector tenants).
[16] By contrast, the response rate to a question on whether "income meets needs" is 98%.

had response rates of 87-90%; one question relating to the number of years in the current tenancy had a response rate of 77%. In each of our regressions, we include missing observations for an independent variable by setting the missing value to zero and including a separate "missing dummy" variable in the regression analysis; in cases of missing observations for a dependent variable, the respondent is omitted from the regression. In the descriptive statistics, missing values are omitted.

The five subjective wellbeing variables comprise: (i) evaluative wellbeing, based on overall satisfaction with one's life; (ii) the WHO-5 mental wellbeing scale; (iii) whānau (extended family/friends) wellbeing; (iv) control over one's life; (v) loneliness. The first two of these wellbeing variables form our principal focus both because of the breadth of these measures in capturing overall wellbeing and because of their wide use in the literature on subjective wellbeing. The survey includes two variables (used as explanatory variables) relating to overall material wellbeing: (i) equivalised household income;[17] and (ii) the degree to which household income meets needs ("*Income meets needs*"). The wording for each of these seven variables (and their response categories) is shown in Appendix 2a.

Table 1 provides descriptive statistics for these seven variables; means are shown for all variables other than *Income meets needs* for which the cumulative distribution function (cdf) is shown. The first column comprises the full sample of tenants in public rentals across all our sites. The second column subsets on tenants in public rentals within the Wellington urban area, while the third and fourth columns show corresponding figures for tenants in private rentals in Wellington and owner-occupiers in Wellington respectively (noting that all private renters and owner-occupiers in our sample are from Wellington). The Wellington public housing summary statistics are very similar to those for the full sample of public housing tenants, so discussion henceforth focuses on this sub-sample when making comparisons to private renters and owner-occupiers. This restriction ensures that we are comparing respondents within the same urban area so abstracting from inter-city differences.

Despite, the selection factors summarised in the previous section with respect to placement in public housing, four of the five subjective wellbeing indicators indicate higher wellbeing, on average, of public renters relative to private renters; the exception is for loneliness in which public renters have a higher loneliness score. The loneliness result may, in part, reflect the

---

[17] Equivalisation uses the sum of all sources of income divided by the square root of household size.

demographics of public tenant households, where a significant proportion is single-person households,[18] and in the Wellington region a notable proportion are refugees and migrants – factors that are independently associated with loneliness (Wright-St Clair et al., 2017). On average, owner-occupiers have higher wellbeing than do public renters on four of the five measures (the exception being a slightly lower score for WHO-5) and have higher wellbeing on all five measures relative to private renters.

The generally higher subjective wellbeing scores for public relative to private renters is despite much higher average incomes of private renters. As expected from the selection criteria for placement in public housing, the average equivalised household income of public renters is just 57% of that for private renters, and only 44% of owner-occupiers. Despite the income disparity, public and private renters have similar proportions of respondents who state that their income is not enough to meet their needs (28% and 27% respectively). When the response category of "only just enough" is added to those who do not have enough, public renters report more income hardship than do private renters, likely reflecting the selection criteria into public housing. Owner-occupiers have much lower proportions of responses in these two categories than do either category of tenant.

Table 1: Subjective wellbeing and material wellbeing descriptive statistics

Variable	Public rental (NZ)	Public rental (Wgtn)	Private rental (Wgtn)	Owner-occupier (Wgtn)
Life satisfaction	6.98	6.99	6.58	7.37
WHO-5	79.7	81.45	68.1	79.5
Whānau wellbeing	6.61	6.73	6.48	7.05
Control	7.00	7.11	6.79	7.49
Loneliness	1.25	1.24	1.12	0.80
Equivalised HH income	$17,314	$17,663	$30,884	$40,170
Income meets needs				
not enough	27%	28%	27%	16%
+ only just enough	72%	72%	64%	46%
+ enough	98%	97%	91%	95%
+ more than enough	100%	100%	100%	100%
Observations (N)	**445**	**279**	**33**	**92**

Notes: HH= household; Wgtn=Wellington urban area; N=maximum number of observations for each tenancy category; cumulative percentages shown for *Income meets needs*; means shown for all other variables. A higher score for loneliness indicates greater loneliness (i.e. a worsening of wellbeing according to that indicator). All statistics exclude: 5 houses for which tenancy status is unknown, 16 'quality flag' (dubious data) respondents, and missing data for that variable. Total sample (excluding unknown tenancy status and quality flags)=570. Public rental (Wgtn) is a subset of public rental (NZ). All private rental and owner-occupier respondents were within the Wellington urban area.

---

[18] See: https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/official-information-responses/2020/july/r-20200701-request-for-statistics-on-the-number-of-people-in-social-housing-in-nz-and-their-demographics.pdf

Within our sample of public renters, some receive subsidised rents as a consequence of the Income Related Rent Subsidy (IRRS) while some do not, depending on which public housing provider they are a tenant with. We do not have direct survey evidence either on rent paid or on eligibility for an IRRS; however, based on knowledge of the providers, we can attribute IRRS as likely applying to tenants with five of the six providers, and likely not applying for tenants with the remaining provider.[19]

Appendix 3 provides descriptive evidence on the relationships between equivalised household income, receipt of an IRRS and the response to the question on *Income meets needs*. The analysis shows firstly that, of our sample, people in public housing who receive an IRRS have, on average, lower incomes than those who do not receive an IRRS. Secondly, as expected, a significant positive relationship exists between *Income meets needs* and equivalised household income (*HH_Income*). However, *Income meets needs* is not related significantly to receipt of an IRRS after controlling for income (see Appendix 3 for further details and discussion).

The five wellbeing metrics measure different aspects of wellbeing. Table 2 presents the correlation coefficients between the five wellbeing variables for the full sample. All are positively correlated (noting that reduced loneliness indicates greater subjective wellbeing). The strongest correlations are between *Life satisfaction*, *Control* (over one's life) and *WHO-5* (mental wellbeing scale). *Whānau wellbeing* has moderate correlations (ranging 0.20 to 0.37) with the other variables. We note that relevant whānau members may not reside with the respondent so may be in different forms of housing tenure.

Table 2: Correlation coefficients: Five wellbeing metrics (full sample)

	Life satisfaction	Whānau wellbeing	Control	Loneliness	WHO-5
Life-satisfaction	1.000				
Whānau wellbeing	0.371	1.000			
Control	0.604	0.319	1.000		
Loneliness	-0.376	-0.203	-0.289	1.000	
WHO-5	0.550	0.335	0.455	-0.428	1.000

Notes: Full sample excludes quality-flagged respondents. A higher score for loneliness is a negative wellbeing outcome, consistent with the negative correlation coefficients.

---

[19] The IRRS is paid to Kāinga Ora or to an eligible housing provider. A tenant who is with a housing provider that is eligible for the IRRS has their rent capped relative to their income. WCC (Wellington City Council) is the provider that (at the time of our survey) was not eligible for the IRRS. In some of our other public housing settings, tenants who were not eligible for an IRRS-related rental subsidy may have received other forms of rental relief from the provider.

The large number of potential explanatory variables, many of which measure similar concepts so having high correlations, makes inclusion of all variables in the analysis challenging. To address this challenge, we have combined variables into groups that are broadly conceptually related and then have taken one or more principal components of each group to reflect the variation of variables in that group. This process leads to the adoption of 11 principal components variously comprising factors relating to: having a cold house, having a damp house, house suitability, dwelling condition, heating type, material wellbeing, neighbourhood and social capital, Māori culture, discrimination, spirituality, and public transport. The formulation of the principal components is outlined in more detail in Appendix 4.[20]

In addition to the variables comprising the principal components, a range of personal characteristics is included in our analysis. These characteristics comprise: age bands (6 dummy variables[21]), ethnicities (4), gender (2), presence of children of different ages (2), household size[22], self-rated health (4), self-rated long-term illness, disability status (Washington disability, level 3), labour force status (3), and a quadratic for number of years in current tenancy. Table A5.1 in Appendix 5 provides summary statistics for the personal characteristics variables and for other variables that are highlighted in the analysis that follows for the main Wellington regression sample.

In section 4, we focus on three additional dependent variables relating to micro-geography of the neighbourhood, which we name: *Visitors*, *Home suits*, *Area suits*. *Visitors* refers to the respondent's pride in their home, *Home suits* refers to the respondent's view of the suitability of their home, while *Area suits* refers to the respondent's view of the suitability of their neighbourhood; Appendix 2b provides the full questions (and response categories) used in the survey for each of these variables.[23]

Table 3 presents the distribution of each of these three variables, starting in each case from the least desirable category. The same tenancy groups are used as in Table 1. The Wellington sub-sample of public housing tenants again closely resembles the full sample of public housing tenants, so we focus on the former for comparative purposes. In terms of house quality, private

---

[20] Note that the loadings on the principal components are driven by the correlations amongst variables and are not researcher-driven (once the broad groups of variables have been specified).

[21] Plus a base category; base categories are added to the other characteristics where appropriate.

[22] Household size is already accounted for in our measure of equivalised household income, but is still included as a personal characteristic since household structure may also influence wellbeing separately, for instance through preferences regarding living with other family members.

[23] Both *Visitors* and *Home suits* are included (with high loadings) in the "house suitability" principal component (pc1b) while *Area suits* is included (with a high loading) in the "neighbourhood and social capital" principal component (pc1n).

rentals are F-dominated (Allison and Foster, 2004) by both public rentals and owner-occupied homes; i.e. their cumulative distribution function (cdf) lies everywhere above those of the other two tenancy types so are unambiguously viewed as being 'worse' than are public rentals or owner-occupied homes. In turn, public rentals are F-dominated by owner-occupied homes for both categories. By contrast, for the neighbourhood, private rentals F-dominate the other two categories while there is no F-dominance of either public rentals or owner-occupied homes in relation to each other (i.e. the cdf's cross for these two categories). Overall, in comparing the two rental tenancy types, the cdf's indicate that tenants in public housing view their house more favourably than do tenants in private rentals, but the opposite is the case for views of neighbourhood suitability.

Table 3: Cumulative distribution functions for *Visitors*, *Home suits*, *Area suits* (%)

Variable	Public rental (NZ)	Public rental (Wgtn)	Private rental (Wgtn)	Owner-occupier (Wgtn)
Visitors				
I try to avoid having visitors	7	9	15	8
+ I feel a little shy	20	23	36	21
+ I feel ok to have visitors	50	56	67	51
+ I'm pleased to have visitors	73	78	88	74
+ I'm proud of my house	100	100	100	100
Home suits				
Strongly disagree	3	4	6	1
+ Disagree	11	12	15	5
+ Neither agree nor disagree	31	35	39	24
+ Agree	75	77	85	77
+ Strongly agree	100	100	100	100
Area suits				
Strongly disagree	4	5	3	3
+ Disagree	9	11	9	9
+ Neither agree nor disagree	32	36	30	37
+ Agree	76	79	70	82
+ Strongly agree	100	100	100	100
N	**445**	**279**	**33**	**92**

Notes: Cumulative distribution functions in each case start with the least desirable category; Wgtn=Wellington urban area; N=maximum number of observations for each tenancy category; All statistics exclude: 5 houses for which tenancy status is unknown, 16 'quality flag' (dubious data) respondents, and missing data for that variable. Total sample (excluding unknown tenancy status and quality flags)=570. Public rental (Wgtn) is a subset of public rental (NZ). All private rental and owner-occupier data respondents were within the Wellington urban area.

.

5: Empirical findings

5.1 Public housing and tenant wellbeing

Our first research questions asks whether public housing is associated with higher tenant wellbeing relative to other forms of tenure (private rental and owner-occupation). To address this question, we estimate a series of OLS and ordered logit regressions for respondents from the Wellington urban area (to abstract from inter-city differences), specified as follows:

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \varepsilon_i \qquad\qquad (1)$$

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \beta_2 D_i + \beta_3 P_i + \varepsilon_i \qquad\qquad (2)$$

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \beta_2 D_i + \beta_3 P_i + \beta_4 H_i + \beta_5 N_i + \varepsilon_i \qquad\qquad (3)$$

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \beta_2 D_i + \beta_3 P_i + \beta_4 Home\ suits_i + \beta_5 Area\ suits_i + \varepsilon_i \quad (4)$$

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \beta_2 D_i + \beta_3 P_i + \beta_4 Visitors_i + \beta_5 Area\ suits_i + \varepsilon_i \qquad (5)$$

where:

W_i^m	is one of the five wellbeing metrics (*m*) for respondent *i*;
$Tenancy_i$	is a vector of tenancy status (public rental, private rental, owner-occupier);
D_i	is a vector of demographic variables;[24]
P_i	is a vector of other personal variables;[25]
H_i	is a vector of house variables;[26]
N_i	is a vector of neighbourhood variables;[27]
$Home\ suits_i$	is defined in section 4 and Appendix 2b;
$Visitors_i$	is defined in section 4 and Appendix 2b;
$Area\ suits_i$	is defined in section 4 and Appendix 2b.

Equation (1), which is estimated for each of the five wellbeing variables, simply relates each wellbeing metric to tenancy type with no added control variables. Based on those results (presented below), we focus our attention in the main text on the OLS estimates for the *WHO-5* mental wellbeing measure. Results using other specifications and estimators, and results for *Life*

---

[24] The demographic variables comprise: age, ethnicity, gender, presence of children of different ages, household size, self-rated health, self-rated long-term illness, disability status, labour force status and a quadratic for number of years in current tenancy.

[25] The personal variables include the principal components relating to: material wellbeing, Māori culture, discrimination, and spirituality (see section 4 and Appendix 4).

[26] The house variables include the principal components relating to: having a cold house, having a damp house, house suitability, dwelling condition, and heating type (see section 4 and Appendix 4).

[27] The neighbourhood variables include the principal components relating to: neighbourhood and social capital, and public transport (see section 4 and Appendix 4).

satisfaction, are presented in Appendix 6. Equation (2) adds demographic and other personal controls, while equation (3) further adds house and neighbourhood controls. In equation (4), we replace the house controls (principal components) with a single variable *Home suits* and the neighbourhood controls (principal components) with the single variable, *Area suits*. Equation (5) is akin to equation (4) except that the house control variable instead becomes *Visitors*. One potential issue in interpreting the results that include *Visitors*, *Home suits* and *Area suits* is that each of these variables involves a subjective valuation as does the dependent variable. This can raise issues of "shared method variance" in which a respondent's overall degree of positivity affects both the dependent and the explanatory variable(s). One avenue to help control for this issue is to include a separate variable (or variables) that also reflects the respondent's overall positivity (OECD, 2013; Van Praag et al., 2003). We do so in equations (4) and (5) by continuing to include subjective variables in both the D_i and P_i vectors.

OLS estimates of equation (1) are presented in Table 4 for each of the five wellbeing metrics. The results for *WHO-5* indicate that the mental wellbeing of public tenants is higher than that of private tenants (significant at p<0.05). Point estimates also indicate higher wellbeing for public relative to private tenants for each of life satisfaction, control and whānau wellbeing; however, none of these relationships is statistically significant. The wellbeing of public tenants is not significantly different to that of owner-occupiers for any variable other than for loneliness where owner-occupiers are found to experience less loneliness than do public tenants.

Table 4: Wellbeing metrics regressed on tenancy status (Wellington, no controls, OLS)

VARIABLES	WHO-5	Life-satisfaction	Control	Whānau-wb	Loneliness
Tenancy status					
Public rental (base)					
Private rental	-13.322**	-0.413	-0.319	-0.243	-0.122
	(5.328)	(0.323)	(0.374)	(0.339)	(0.199)
Owner-occupier	-1.902	0.384	0.388	0.327	-0.439***
	(3.250)	(0.247)	(0.253)	(0.249)	(0.119)
Constant	81.447***	6.989***	7.107***	6.728***	1.244***
	(1.858)	(0.138)	(0.148)	(0.144)	(0.069)
Observations	386	400	396	392	400
R-squared	0.016	0.010	0.007	0.005	0.027
Controls	NO	NO	NO	NO	NO

Notes: OLS estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

In Appendix 6, we present additional results to check the robustness of the estimates in Table 4. First, Table 4-1 in that appendix presents ordered logit estimates for the five wellbeing metrics using the specification in equation (1). For the *WHO-5* equation, we observe a significant

(p<0.01) negative coefficient for private rentals relative to public rentals; and we observe a significant (p<0.01) negative coefficient for owner-occupiers in the *Loneliness* equation; no other significant coefficients are observed. Each of these results is consistent with the corresponding estimates in Table 4.

Second, Bond and Lang (2019) argue that despite having ordinal dependent variables, ordered logit estimates may not be appropriate for interpreting results as relating to some underlying concept of wellbeing if certain (extreme) functional form assumptions were to hold. To address this issue, Bloem and Oswald (2022) convert the ordinal dependent variable to a binary variable split at (or near) its median, then estimate the corresponding equation using this binary variable. In Table 4-2 (Appendix 6) we follow this approach for our two focal variables (*WHO-5* and *Life satisfaction*) using three separate estimation techniques: OLS, probit and logit. For the *WHO-5* equation, each of the estimates for private rentals is again negative (each significant at 0.05 < p < 0.10) while the estimates for owner-occupiers remain insignificant. For *Life satisfaction*, two of the private rental coefficients are negative and significant at p < 0.05 and the third is negative and significant at 0.05 < p <0.10. Thus, the positive association between *Life satisfaction* and public renters (relative to private renters) is strengthened when adopting the binary approach. Owner-occupation is found to be associated with higher *Life satisfaction* relative to public rentals (0.05 < p < 0.10) consistent with a positive selection effect into owner-occupation. The robustness of results to the adoption of the binary approach implies that functional form issues of the type raised by Bond and Lang are not problematic for the issues being analysed here, so this issue is not considered further in the paper.

While these robustness tests provide support for the hypothesis that public rentals have a beneficial effect on wellbeing (relative to private rentals), they do not include other control variables. We include control variables in Table 5 which presents OLS estimates for *WHO-5* based on equations (2) – (5). The sample for the first four columns is the full Wellington sample; the fifth column restricts attention just to public housing tenants (and hence drops the tenancy status vector). The significant positive association between wellbeing and public rental versus private rental that was apparent without inclusion of control variables remains across all (full sample) specifications, varying from an effect of 10.7 to 13.1, which equates to 37% – 45% of the sample standard deviation of *WHO-5* (29.2).[28] The mental wellbeing of people in public rentals is

---

[28] The similarity in results without control variables (Table 4) to those which include control variables (Table 5) implies also that the findings are unlikely to be sensitive to the exact specification of the principal components used to control for other characteristics.

not significantly different to that of owner-occupiers in any of the specifications, although the point estimates correspond to slightly higher wellbeing for those in public rentals relative to owner-occupiers.

The specifications based on equations (4) and (5) that use the single variable proxies for each of house suitability and neighbourhood suitability provide greater explanatory power than do those which use principal components to represent these two micro-geography facets. As indicated by the Wald tests presented below the table, *Area suits* shows a significant positive gradient (beyond the insignificant "disagree" response) indicating that wellbeing increases as satisfaction with the neighbourhood increases. The *Visitors* variable is also significantly related to tenant wellbeing, while *Home suits* has no significant relationship with wellbeing. For *Visitors*, the key differentiation is between those who "try to avoid having visitors because of the state or condition of my house" relative to all other categories.

The final column of the table corresponds to the fourth column but restricts the sample just to public housing tenants in Wellington. Very similar (statistically significant) patterns are observed with respect to neighbourhood suitability as for the full sample; for *Visitors*, the patterns are the same as before (and two responses are marginally significant) but the overall variable is no longer statistically significant. This latter result may reflect the generally higher standard of public rentals relative to private rentals in our sample (see Table 3).

We present robustness tests of the estimates in Table 5 in additional tables in Appendix 6. Table 5-1 of that appendix presents ordered logit estimates corresponding to those of Table 5, with qualitatively very similar results. Tables 5-2 and 5-3 present OLS and ordered logit estimates with *Life satisfaction* as the dependent wellbeing variable. In each of these two tables we observe a negative point estimate for private relative to public rentals, with four of the eight estimates significant at $0.05 < p < 0.10$. Tenants in public rentals have approximately ½ point higher *Life satisfaction* relative to those in private rentals across these specifications (approximately equal to 25% of one standard deviation in *Life satisfaction*).

Table 5: WHO-5 regressed on tenancy status (with controls; OLS)

VARIABLES	Eqn (2)	Eqn (3)	Eqn (4)	Eqn (5)	Eqn (5)
Sample	All	All	All	All	Public
Tenancy status					
Public rental (base)					
Private rental	-10.774**	-10.731**	-13.061**	-12.280**	
	(5.052)	(5.065)	(5.237)	(5.068)	
Owner occupier	-3.041	-4.410	-3.675	-3.354	
	(3.456)	(3.543)	(3.284)	(3.210)	
Home suits					
Strongly disagree (base)					
Disagree			-8.006		
			(8.243)		
Neither agree nor disagree			-5.833		
			(6.212)		
Agree			-1.263		
			(5.959)		
Strongly agree			2.869		
			(6.291)		
Visitors					
Avoid due to house condition (base)					
Feel a little shy				13.253**	12.079*
				(5.326)	(7.191)
Feel okay				8.378*	5.035
				(4.995)	(6.587)
Feel pleased (not shy)				14.649***	7.398
				(5.078)	(6.708)
Proud of my house				12.738**	12.895*
				(5.587)	(7.340)
Area suits					
Strongly disagree (base)					
Disagree			-2.565	-3.779	-5.602
			(9.648)	(9.138)	(12.193)
Neither agree nor disagree			12.901	11.768	11.910
			(8.630)	(8.430)	(9.837)
Agree			13.494	14.177*	16.070*
			(8.511)	(8.389)	(9.707)
Strongly agree			21.530**	23.952***	23.089**
			(8.846)	(8.663)	(10.278)
Observations	376	376	376	376	258
R-squared	0.413	0.429	0.479	0.488	0.536
Demographic controls	YES	YES	YES	YES	YES
Other personal controls	YES	YES	YES	YES	YES
House controls	NO	YES	NO	NO	NO
Neighbourhood controls	NO	YES	NO	NO	NO

Notes: OLS estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Wald tests for column 3: Home suits F=1.31, Area suits F=3.85***.
Wald tests for column 4: Visitors F=2.63**, Area suits F=6.83***.
Wald tests for column 5: Visitors F=1.44, Area suits F=4.70***.

5.2 Wellbeing, tenure type and tenant characteristics

While controlling for personal and other characteristics, the results presented above do not differentiate relationships between tenancy type and wellbeing according to tenant characteristics. Here, we extend equation (5) to include interactions between tenancy type and demographic characteristics. We concentrate on the characteristics included as "Demographic controls" in the prior specifications. We also test for interactions of tenancy type with three material wellbeing variables discussed in the analysis above: *HH_Income*, *Income meets needs* and *IRRS* (income related rents). Finally, we test for interaction effects of a measure of household crowding defined as people per bedroom (the ratio of the number of people in the household to the number of bedrooms).[29]

The resulting specification is shown as equation (6):

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \beta_2 Tenancy_i * Characteristic_i + \beta_3 D_i + \beta_4 P_i$$
$$+ \beta_5 Visitors_i + \beta_6 Area\ suits_i + \varepsilon_i \qquad (6)$$

where $Characteristic_i$ is one of the variables that appears in the D_i vector (or is one of the additional four variables noted above) which is interacted with each category of $Tenancy_i$. To keep the analysis manageable, each characteristic is interacted in separate regressions (for the full Wellington sample). We use a Wald test for each housing type to test for significance of variables such as *Income meets needs* that have multiple categories.

After controlling for the demographic and other variables, none of the variables relating to ethnicity, age, gender, household structure, health, employment status, crowding or material wellbeing records an interaction effect that is significant at the 5% level. The only significant interaction effect is that for years of occupancy in the current house.

Figure 1 plots the difference in *WHO-5* for a private renter versus a public renter against the number of years of occupancy in the current house.[30] Similarly, Figure 2 plots the difference in *WHO-5* for an owner-occupier versus a public renter against years of occupancy. The first figure indicates that private renters with short tenancies have significantly lower *WHO-5* scores than do public renters with the same length of tenancy and remain significantly lower after five years

---

[29] Torshizian and Grimes (2021) demonstrate that this crowding measure produces similar results in a wellbeing context as do more complex measures such as the Canadian National Occupancy Standard.
[30] The figure is plotted for up to 20 years occupancy since only one private renter has occupancy >22 years and only 10% of public renters have occupancy >22 years.

of tenancy; however, they catch up after 20 years of occupancy (and are no longer significantly different after ten years of occupancy). The second figure indicates a similar pattern for owner-occupiers relative to public renters, but with a smaller initial effect.

For new tenancies, the difference in mental wellbeing between public and private renters is greater than that between public renters and owner-occupiers. However, the gradient for private renters (relative to public renters) is greater than that for owner-occupiers (both gradients are significant at p<0.01). The gradients reflect three factors. First, each year of extra occupancy for a public renter is associated with a decrease in *WHO-5* of 0.34 points. This decline in the *WHO-5* score over time may reflect an initial boost in mental wellbeing for new public renters relative to their former tenancy. By contrast, each year of extra occupancy for a private renter is associated with an increase in *WHO-5* of 0.49 points, consistent with wellbeing being positively associated with greater stability in tenancy. Each year of owner-occupation is associated with a much smaller increase in mental wellbeing of 0.16 points, indicating that the benefits of owner-occupation are fairly stable once the homeowner has moved in.

Figures 1-1 and 2-1 in Appendix 6 show corresponding plots for when *Life satisfaction* is the dependent variable in equation (6). The figures show very similar relationships for the difference in wellbeing of public versus private tenants (and versus owner-occupiers) in relation to years of occupancy in the current dwelling.

The consistency of wellbeing advantage for public versus private rentals shown by the non-significance of the interaction terms (other than for occupancy length) indicates that the likely source of advantage of being in a public rental is not due to material wellbeing determinants (i.e. incomes or income related rents) or to suitability of public tenancies for particular population segments. Rather, the evidence suggests that the source of advantage may relate to the uncertainty of tenancy in private rentals, reflecting New Zealand's tenancy laws which historically have enabled landlords to evict tenants in many situations at short notice.[31] By contrast, public tenancies enable long-term occupancy with additional support for sustaining tenancies, with resulting advantages in terms of building social capital and reducing stress related to uncertain tenancies.

---

[31] The 2021 Residential Tenancies Act Amendment introduced during the Covid pandemic placed restrictions on landlords' abilities to give short notice.

Figure 1: Contrast plot for WHO-5, private renters v public renters by occupancy length
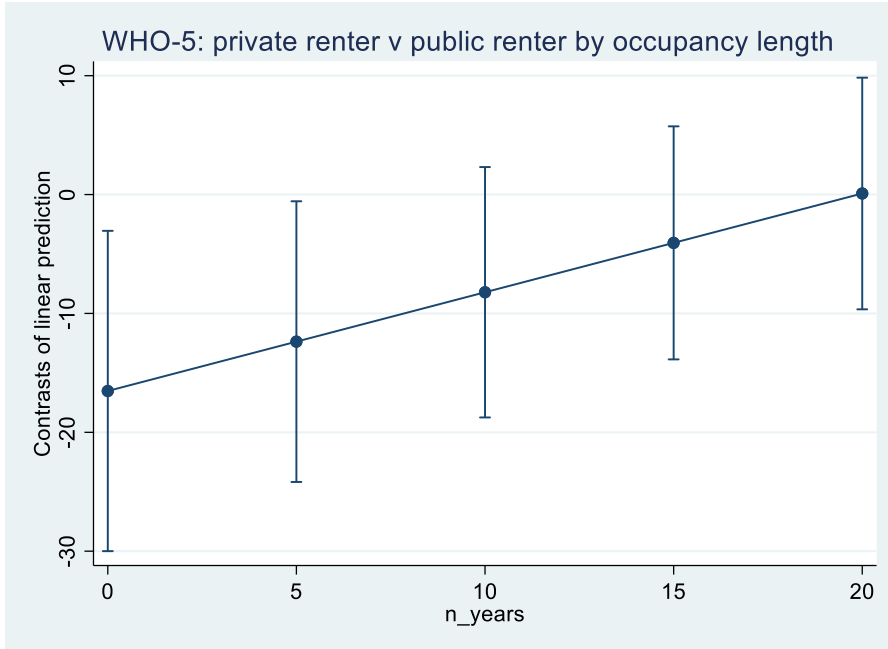
Notes: The figure contrasts the estimated *WHO-5* for a private renter versus a public renter according to number of years of occupancy in the current house, based on equation (6) with 95% confidence intervals shown (holding other variables at their means); n_years is occupancy length. The figure indicates that private renters with short tenancies have significantly lower *WHO-5* scores than public renters, with *WHO-5* scores catching up after 20 years of occupancy.

Figure 2: Contrast plot for WHO-5, owner occupiers v public renters by occupancy length
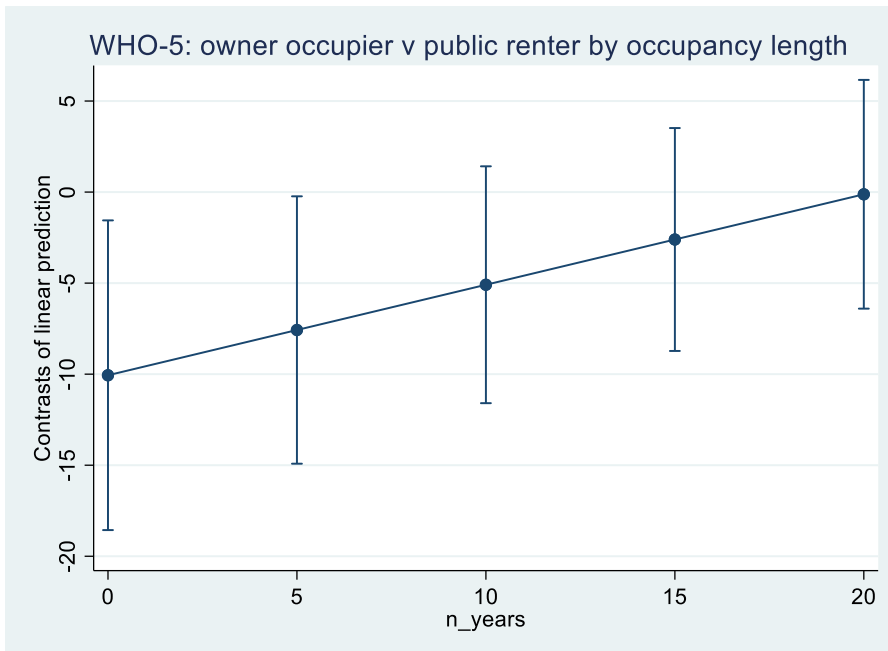
Notes: The figure contrasts the estimated *WHO-5* for an owner-occupier versus a public renter according to number of years of occupancy in the current house, based on equation (6) with 95% confidence intervals shown (holding other variables at their means); n_years is occupancy length. The figure indicates that owner-occupiers with short tenancies initially have significantly lower *WHO-5* scores than public renters, with *WHO-5* scores catching up after 20 years of occupancy.

5.3   Micro-geography of house and neighbourhood suitability

The results in Table 5 indicate that residents' wellbeing is associated not just with tenancy type but also with self-reported suitability of their house and of their neighbourhood. Here we investigate the house and neighbourhood characteristics that are most closely associated with how the resident sees their house and neighbourhood. For house suitability, we examine associations of house characteristics with each of *Visitors* and *Home suits*; for neighbourhood suitability, we examine associations of neighbourhood characteristics with *Area suits*.

In each case, we focus attention on the characteristics included in the relevant principal components (see Appendix 4) while including the other principal components plus the demographic variables as controls. Thus, for house suitability, we focus on the associations of each of *Visitors* and *Home suits* with the variables included within pc1c (cold house), pc2c (damp house), pc1b (house suitability), pc1h (dwelling condition) and pc2h (heating type). For neighbourhood suitability, we focus on the associations of *Area suits* with the variables that are included within pc1n (neighbourhood and social capital). Accordingly, for the house suitability variables, we start with the specifications shown as (7) and (8):

$$Visitors_i \quad = \beta_0 + \beta_1 Tenancy_i + \beta_2 D_i + \beta_3 P_i + \beta_4 N_i + \gamma_1 H_{1i} + \cdots + \gamma_J H_{Ji} + \varepsilon_i \quad (7)$$

$$Home\ suits_i = \beta_0 + \beta_1 Tenancy_i + \beta_2 D_i + \beta_3 P_i + \beta_4 N_i + \delta_1 H_{1i} + \cdots + \delta_J H_{Ji} + \varepsilon_i \quad (8)$$

where $H_{1i} \dots H_{Ji}$ are the J variables used to calculate the principal components pc1c, pc2c, pc1b, pc1h and pc2h.

A key challenge in trying to estimate these associations is that many of the explanatory variables within H_i are correlated with each other (hence the use of principal components in the analyses above). To extricate the key associations, we have used a general-to-specific search for the variables that have the strongest associations (in a statistical sense) with each of the dependent variables. Initially, all variables are included in the specification, and all groups that have p>0.25 are removed (using a Wald test, where a group refers to a multi-category variable or a combination of variables that are related; the latter includes ethnicity, gender and household composition). From the resulting specification, all variables with p>0.20 are removed. The remaining groups of variables are all significant at p<0.10 for each of *Visitors* and *Home suits*. We then add back all omitted variables one-by-one to the resulting specification as a check that

relevant variables had not been omitted through this process; none were significant at p<0.05 when added.

The analysis above is conducted with both OLS and ordered logit regressions, producing very similar results (in terms of variable significance). The OLS and ordered logit results are presented in Table 6 for each of the two housing suitability variables.

House-related conditions that are estimated to affect each housing suitability variable relate to: dwelling condition, dampness and cold. In addition, lack of any form of heating appliance in the house is associated with a reluctance to invite visitors to the house. Based on the OLS estimates, having a dwelling that is in excellent condition is estimated to raise both *Visitors* and *Home suits* (each measured on a 5-point scale) by around 1½ points; while living in an always damp and cold house (in which one shivers) reduces each variable by around ⅔ to 1 point. The importance of these variables for residents' perceptions of housing suitability is consistent with prior work in New Zealand on housing quality, especially cold and dampness (Stats NZ, 2020; Fyfe et al., 2022). Having a house that is too warm in summer is associated with a negative perception of housing suitability (for *House suits* only, with $0.05 < p < 0.10$). While Wellington currently has a relatively cool to temperate climate, the expectation of rising temperatures and of increased frequency and intensity of heat events, indicates that this issue warrants further investigation.

The public transport principal component is significant for *Visitors* (at p<0.001) indicating that residents may not feel it appropriate to invite people to their house where they are not well serviced by public transport. However, this variable is not related significantly to *Home suits*. Owner-occupiers (not surprisingly) consider that their house suits their needs more than do renters, while those who have had longer tenancies are more likely to be comfortable in welcoming visitors to their home.

For neighbourhood suitability (*Area suits*), we start with the specification shown as (9):

$$Area\ suits_i = \ \beta_0 + \beta_1 Tenancy_i + \beta_2 D_i + \beta_3 P_i + \beta_4 H_i + \theta_1 N_{1i} + \cdots + \ \theta_k N_{Ki} + \varepsilon_i \quad (9)$$

where $N_{1i} \ldots N_{Ki}$ are the K variables used to calculate the principal component pc1n.

Following the same procedure as for housing suitability, we obtain two specifications. The first specification is obtained through the general-to-specific search, without adding back any variables that may have been omitted through the process; the second specification adds back

the one variable (occupancy length) that is significant at p<0.05 when added to that specification. The OLS and ordered logit estimates for these two specifications are presented in Table 7.

The estimates indicate that social capital is an important aspect of neighbourhood suitability. The variables relating to belonging to the neighbourhood and ease of gaining help when away are both significantly associated with *Area suits*. A very strong sense of neighbourhood belonging (relative to a very weak sense) is associated with approximately a 1¼ point lift in *Area suits* (measured on a 5-point scale), while finding it very easy to gain help when away (relative to finding such assistance to be very hard) is associated with an approximate ¾ point lift.

Other variables related to *Area suits* are a sense of belonging to one's whānau and the number of networks that one has (though the patterns of relationship for these two variables is less obvious, and the former is not significant at the 5% level in three of the four sets of estimates). Occupancy length, which may also indicate a social capital connection, is related through a quadratic relationship in which longer occupancy is associated with higher values for *Area suits* (noting that the direction of causality could run in either direction).

Neighbourhood safety is significantly related to residents' perceptions of the suitability of their area. People who find their area to be very safe at night have approximately ¼ point lift in *Area suits* relative to those who find the area to be very unsafe. Further (unreported) estimates show that this relationship is unrelated to the respondent's gender.

A cold house is significantly related to area suitability. While this variable may be specifically related to the resident's house, it could also be related to the geographic characteristics in which the house is located. Prior work relating to Wellington (a very hilly city) indicates that houses which receive more sunshine (and hence more natural radiant heat) have a significant price premium relative to less sunny houses (Fleming et al., 2018).

Together, the results for housing and neighbourhood suitability indicate the importance of several micro-geography characteristics that relate to people's perceptions of their environment. People are more satisfied with their immediate surroundings when they live in a house that is in good condition, warm and dry, and is in a safe neighbourhood in which there is strong social capital. Good access to public transport is relevant to people's comfort in inviting others to their home.

It is also important to note variables that are not significantly related to residents' perceptions of house and neighbourhood suitability. With respect to house suitability, variables that are not significantly associated with either *Visitors* or *Home suits* include telecommunications availability (for landline, internet or cellphone[32]) and crowding. With respect to neighbourhood suitability, variables that are not significantly associated with *Area suits* include subjective perceptions of access to green space, and a number of social capital-related factors such as the respondent's generalised trust in others, and their voting and volunteering behaviours. However, social capital related to the extent of the respondent's networks is accounted for.[33] The insignificance of access to green space is likely to reflect the fact that 80% of the sample answered that they had either "very easy" or "easy" access to green space, and a further 12% answered "neither easy nor difficult"; these answers reflect the proximity to green space for most residents in Wellington.

---

[32] Note that we are controlling for material wellbeing which may account for the lack of significance of these forms of communication.

[33] It is possible that the individual's view of the degree of social capital embedded in their community (rather than the networks of the individual) is also a determinant of the respondent's view on whether the area suits (Carlin et al., 2017); however, we have no measure of this aspect.

Table 6: Associations with *Visitors* and *Home suits*

VARIABLES	(1) OLS Visitors	(2) Ologit Visitors	(3) OLS Home suits	(4) Ologit Home suits
Dwelling condition (base: very poor)				
Poor	0.206	0.567	0.385	0.732
	(0.423)	(1.095)	(0.350)	(0.725)
Average	0.822**	2.024*	0.726**	1.463**
	(0.393)	(1.084)	(0.334)	(0.721)
Good	1.166***	2.720**	1.109***	2.420***
	(0.402)	(1.123)	(0.333)	(0.734)
Excellent	1.604***	3.617***	1.361***	3.217***
	(0.413)	(1.150)	(0.347)	(0.787)
Damp house (base: No)				
Sometimes	-0.319**	-0.618**	-0.101	-0.330
	(0.142)	(0.295)	(0.112)	(0.270)
Always	-0.794***	-1.425***	-0.380*	-0.944**
	(0.216)	(0.460)	(0.210)	(0.457)
Shiver indoors in winter (base: No)				
Yes	-0.309**	-0.664***	-0.273***	-0.639***
	(0.124)	(0.242)	(0.104)	(0.246)
No heater in house	-0.844***	-1.744***		
	(0.305)	(0.560)		
Public transport (principal component)	0.082***	0.210***		
	(0.015)	(0.046)		
Too warm in summer (base: No)				
Sometimes			-0.136	-0.196
			(0.099)	(0.247)
Often			-0.391**	-0.729*
			(0.170)	(0.394)
Always			0.091	0.424
			(0.170)	(0.461)
House tenure type				
Private rental			0.252	0.588
			(0.199)	(0.442)
Owner occupier			0.416***	0.994***
			(0.111)	(0.271)
Occupancy length				
Years	-0.015	-0.043		
	(0.014)	(0.031)		
Years squared	0.001*	0.001**		
	(0.000)	(0.001)		
Household composition				
Under 5 yr olds present			-0.263	-0.515
			(0.225)	(0.448)
5-17 year olds present			0.191	0.536*
			(0.135)	(0.321)
Household size			-0.070**	-0.180**
			(0.033)	(0.076)
Ethnicity (base: European)				
Māori	0.076	0.140		
	(0.121)	(0.245)		
Pacific	0.391***	0.921***		
	(0.125)	(0.261)		
Asian	-0.412	-0.922		

	(0.467)	(0.927)		
Other	-0.129	-0.257		
	(0.163)	(0.322)		
Gender (base: Female)				
Male	0.157	0.305	0.247**	0.525**
	(0.113)	(0.231)	(0.102)	(0.248)
Alt gender	0.923**	1.816*	0.526	0.996
	(0.380)	(0.934)	(0.354)	(0.974)
Health overall (base: Poor)				
Fair	0.224	0.456	-0.029	-0.074
	(0.238)	(0.480)	(0.194)	(0.441)
Good	0.263	0.555	0.201	0.522
	(0.214)	(0.436)	(0.191)	(0.442)
Very good	0.557**	1.146**	0.458**	1.188**
	(0.229)	(0.472)	(0.199)	(0.476)
Excellent	0.367	0.804	0.265	0.827
	(0.277)	(0.595)	(0.255)	(0.627)
Observations	334	334	330	330
R-squared / pseudo R-squared	0.440	0.197	0.380	0.182
Wald tests for joint significance (p-value)				
Dwelling condition	0.000	0.000	0.000	0.000
Damp	0.000	0.000	0.000	0.000
Shiver	0.005	0.002	0.030	0.031
No heater	0.006	0.002		
Public transport (PC)	0.000	0.000		
Too warm in summer			0.074	0.139
House tenure type			0.001	0.001
Occupancy length	0.003	0.008		
Household composition			0.043	0.017
Ethnicity	0.019	0.006		
Gender	0.028	0.073	0.027	0.072
Health overall	0.084	0.084	0.003	0.002

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables for missing observations are included but not reported for Dwelling condition, Damp, Shiver. All variables are defined in Appendices 2 and 5.

Table 7: Associations with A*rea suits*

	(1) OLS Area suits	(2) Ologit Area suits	(3) OLS Area suits	(4 Ologit Area suits
Belong to neighbourhood (base: 0)				
1	0.698*	1.740**	0.760**	2.016**
	(0.368)	(0.880)	(0.375)	(0.928)
2	0.502	1.136	0.536	1.271
	(0.397)	(0.913)	(0.390)	(0.884)
3	0.668**	1.375**	0.708**	1.508**
	(0.298)	(0.681)	(0.293)	(0.675)
4	1.022***	2.135***	1.064***	2.311***
	(0.311)	(0.724)	(0.311)	(0.738)
5	0.926***	2.134***	0.948***	2.226***
	(0.251)	(0.578)	(0.246)	(0.564)
6	1.074***	2.321***	1.111***	2.470***
	(0.294)	(0.681)	(0.289)	(0.674)
7	1.282***	2.922***	1.313***	3.052***
	(0.263)	(0.639)	(0.259)	(0.628)
8	1.195***	2.752***	1.215***	2.852***
	(0.261)	(0.619)	(0.259)	(0.623)
9	1.071***	2.569***	1.134***	2.790***
	(0.275)	(0.663)	(0.271)	(0.662)
10	1.299***	3.204***	1.318***	3.315***
	(0.250)	(0.600)	(0.248)	(0.602)
Ease of help when away (base: Very hard)				
Hard	0.253	0.846	0.273	0.968
	(0.319)	(0.766)	(0.316)	(0.765)
Some	0.571**	1.429**	0.576**	1.530**
	(0.282)	(0.698)	(0.279)	(0.697)
Easy	0.393	1.089	0.369	1.076
	(0.295)	(0.729)	(0.290)	(0.719)
Very easy	0.800***	1.970***	0.771***	1.962***
	(0.300)	(0.764)	(0.295)	(0.757)
Safety of neighbourhood (base: Very unsafe)				
Unsafe	0.092	0.165	0.084	0.143
	(0.228)	(0.555)	(0.227)	(0.549)
Neither safe nor unsafe	-0.133	-0.343	-0.134	-0.345
	(0.205)	(0.477)	(0.203)	(0.470)
Safe	0.299	0.730	0.300	0.763
	(0.212)	(0.519)	(0.210)	(0.512)
Very safe	0.274	0.658	0.285	0.710
	(0.246)	(0.627)	(0.244)	(0.625)
Number of networks (base: 0)				
1	0.137	0.315	0.112	0.245
	(0.160)	(0.386)	(0.162)	(0.389)
2	0.248	0.531	0.252	0.580
	(0.166)	(0.405)	(0.166)	(0.413)
3	0.133	0.351	0.153	0.435
	(0.173)	(0.422)	(0.176)	(0.432)
4	0.263	0.740	0.287	0.856*
	(0.190)	(0.458)	(0.193)	(0.470)
5	0.495*	1.310*	0.474*	1.369*
	(0.252)	(0.695)	(0.260)	(0.722)
6	0.555	1.331	0.596	1.498

	(0.387)	(1.180)	(0.390)	(1.207)
7	0.112	0.084	0.042	-0.074
	(0.246)	(0.655)	(0.240)	(0.617)
8	-0.912***	-2.428***	-0.896***	-2.397***
	(0.259)	(0.649)	(0.265)	(0.668)
9	1.870***	17.743***	1.904***	16.619***
	(0.357)	(1.288)	(0.369)	(1.313)
Belong to whānau (base: 0)				
1	0.032	0.188	0.016	0.150
	(0.516)	(1.347)	(0.523)	(1.392)
2	-0.358	-1.114	-0.338	-1.181
	(0.367)	(0.946)	(0.372)	(0.988)
3	-0.740	-1.527	-0.732	-1.513
	(0.475)	(1.288)	(0.482)	(1.314)
4	-0.487	-1.097	-0.443	-1.027
	(0.345)	(0.813)	(0.358)	(0.859)
5	-0.328	-0.822	-0.324	-0.827
	(0.319)	(0.716)	(0.324)	(0.741)
6	0.269	0.739	0.292	0.839
	(0.362)	(0.800)	(0.371)	(0.832)
7	-0.048	0.025	-0.073	-0.095
	(0.420)	(1.074)	(0.425)	(1.096)
8	0.213	0.476	0.207	0.450
	(0.348)	(0.798)	(0.354)	(0.828)
9	0.043	0.092	-0.011	-0.099
	(0.344)	(0.805)	(0.348)	(0.826)
10	-0.033	-0.021	-0.046	-0.069
	(0.294)	(0.681)	(0.299)	(0.704)
Cold house (principal component)	-0.096***	-0.236***	-0.099***	-0.251***
	(0.027)	(0.065)	(0.027)	(0.064)
Occupancy length				
Years			-0.001	-0.004
			(0.012)	(0.030)
Years squared			0.000	0.001
			(0.000)	(0.001)
Gender				
Male	0.009	-0.019	0.006	-0.042
	(0.111)	(0.276)	(0.114)	(0.285)
Alt gender	-0.889***	-2.419***	-0.850***	-2.356***
	(0.181)	(0.470)	(0.183)	(0.481)
Household composition				
Under 5 yr olds present	-0.203	-0.319	-0.154	-0.192
	(0.229)	(0.556)	(0.231)	(0.570)
5-17 year olds present	-0.122	-0.333	-0.102	-0.294
	(0.135)	(0.357)	(0.137)	(0.366)
Household size	-0.122***	-0.293***	-0.132***	-0.331***
	(0.032)	(0.071)	(0.034)	(0.081)
Health overall (base: Poor)				
Fair	0.710***	1.598***	0.738***	1.707***
	(0.235)	(0.573)	(0.234)	(0.577)
Good	0.778***	1.840***	0.819***	2.006***
	(0.246)	(0.591)	(0.245)	(0.599)
Very good	0.812***	1.870***	0.844***	2.014***
	(0.242)	(0.597)	(0.240)	(0.600)
Excellent	0.567*	1.221	0.589*	1.308*

	(0.304)	(0.753)	(0.305)	(0.764)
Observations	326	326	326	326
R-squared / pseudo R-squared	0.442	0.2	0.451	0.207
Wald tests for joint significance (p-value)				
Belong to neighbourhood	0.000	0.000	0.000	0.000
Ease of help when away	0.002	0.005	0.003	0.006
Safety of neighbourhood at night	0.025	0.030	0.022	0.021
Number of networks	0.000	0.000	0.000	0.000
Belong to whānau	0.043	0.059	0.073	0.081
Cold in the house (PC)	0.000	0.000	0.000	0.000
Occupancy length			0.042	0.020
Gender	0.000	0.000	0.000	0.000
Household composition	0.000	0.000	0.000	0.000
Health overall	0.014	0.019	0.009	0.010

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables for missing observations are included but not reported for Belong to whānau, Belong to neighbourhood, Ease of help when away. All variables are defined in Appendices 2 and 5.

The results presented in Tables 6 and 7 control for personal characteristics but do not show whether people with different characteristics value features of the house and neighbourhood differently. Here, we concentrate on potential differences across three groups of people (each relative to all others in the sample): *Māori* (23% of the sample), *Pacific* (26%) and *Males* (37%). Māori and Pacific are highlighted due to their high representation in public housing relative to their population size, while examining valuations of housing and neighbourhood features for males (relative to females) highlights whether a gender perspective on these matters is needed.[34]

For *Visitors*, to test whether the importance of house characteristics differ for Māori relative to other ethnicities, we begin with the most general specification including house characteristics and interact each house characteristic with the indicator for Māori ethnicity. We then test whether the interaction term(s) is/are significant (using a Wald test for variables with multiple response categories). Separately, we follow the same procedure for indicators for Pacific and for male. The same approach is then undertaken for *Home suits* (with the same starting point for house characteristics) and for *Area suits* (with neighbourhood characteristics).

For the interaction of *Māori* with *Visitors*, *Dwelling condition* shows a significant difference (p<0.001), with Māori placing greater importance on dwelling condition when assessing house suitability. Māori also record a negative effect of "sometimes" observing mould in their house

---

[34] We have not examined whether each of the associations differs according to other individual characteristics such as household composition. We have also not tested whether other aspects such as Public Transport have differing associations depending on personal characteristics. Such analyses could form extensions of the current work.

(p=0.017, relative to not observing mould).[35] This heightened importance for Māori of the home environment for welcoming visitors to one's house is consistent with analyses of Māori wellbeing in relation to housing quality (Penny et al., forthcoming).

For *Pacific*, the only significant interaction with respect to *Visitors* is for "sometimes" observing mould which indicates a positive effect on house suitability relative to a house with either no mould or one "always" having mould. This curious result may reflect the different distribution of mould in houses across Māori, Pacific, and all other ethnicities. In the estimation sample, the proportion of the three ethnic groups with no mould is 66%, 35%, 66% respectively, while the respective proportions for "always having mould "are 13%, 24%, 11%. Thus, Pacific households have a considerably greater prevalence of "sometimes" and "always" experiencing mould than do other ethnicities.

For the interaction of *Males* with *Visitors*, *Dwelling condition* is the only variable with a significant interaction term (p=0.007). The results indicate that, unlike other genders, males do not rate their house suitability more negatively when the dwelling is in poor condition. Of course, while the house may subjectively be considered as suitable for meeting needs by male tenants even when the dwelling condition is poor, this does not negate the potential for poor housing quality to impact negatively on their health and wellbeing (Howden-Chapman, Bennett, et al., 2023).

With respect to *Home suits*, *Māori* have a more positive view of their dwelling if they have an internet connection (p=0.024) and a more negative view if they shiver indoors in winter (p=0.042). No significant interaction effects are found for *Pacific*. For *Home suits*, *Males* again display indifference with respect to dwelling condition (p=0.044 for the interaction terms) and similarly display indifference to having a damp house (p=0.042 for the interaction terms). The reaction of *Males* with respect to mould is ambiguous, being more negatively affected by "sometimes" observing mould relative to having no mould (p=0.003) but not by "always" observing mould.

---

[35] Two additional significant interaction terms that relate to cold, show conflicting indications: being able to see one's breath in winter has a positive association with *Visitors* (p=0.012) while not having any form of heating has a negative association with *Visitors*. The significant effects of having a cold house are maintained after accounting for these factors.

Turning to neighbourhood suitability, we find no significant interaction terms for *Māori* and only one significant interaction for *Pacific* (relating to generalised trust in others)[36] and one for *Males* (relating to help when away).[37]

Overall, the clearest differentiations according to ethnicity or gender with respect to views of home and neighbourhood suitability are observed with respect to the home. Of these differences, the starkest are those that relate to dwelling condition. The state of the dwelling is more important for Māori than it is for other ethnicities (consistent with prior literature). Males, on average, appear to be relatively unaffected by dwelling conditions in a subjective sense relative to people of other genders (although this does not imply that the objective health consequences of poor housing differ according to gender).

These findings are illustrated in Figures 3 and 4. Figure 3 plots predicted values for Visitors for each of Māori and non-Māori for the five values of dwelling condition (*d_dwell_cond*) ranging from 1 (very poor) to 5 (excellent). The dependent variable (*Visitors*) has a range from 0 (I try to avoid having visitors) to 4 (I'm proud of my house). The figure shows that when dwelling condition is very poor or poor (i.e. 1 or 2), Māori are much less comfortable in having visitors to their house than are people of other ethnicities.[38] Given the importance of relationships and relationship-building for supporting Māori wellbeing in housing and urban environments (Penny, et al., forthcoming), this finding suggests that dwelling condition and the ability to welcome guests into a healthy home environment is of substantial importance for Māori; additional qualitative research (currently being undertaken) could further illuminate this issue. Figure 4 presents the corresponding plot for Males (versus non-Males). The estimates indicate that males are not (on average) concerned about residing in a house that is in very poor condition, whereas non-Males are reluctant to welcome visitors to a house in very poor condition.

An important corollary of these findings is that, in terms of micro-geography, there may well be significant differences in the ways that certain groups perceive the relevance and importance of various facets of their home or neighbourhood. Thus, analysts need to exercise care in generalising results with respect to micro-geographic factors across population groups.

---

[36] While the interaction terms are strongly significant (p=0.002), there is no clear pattern of differentiation across the 11 trust categories.

[37] While these interaction terms are significant (p=0.021), there is again no clear pattern of differentiation across the 4 response categories.

[38] While the 95% confidence intervals overlap for the two lowest values of dwelling condition, the estimates for Māori and non-Māori are significantly different from each other at the 5% level (p=0.010 and p=0.049 respectively).

Figure 3: Predicted values for *Visitors*, Māori vs non-Māori by dwelling condition
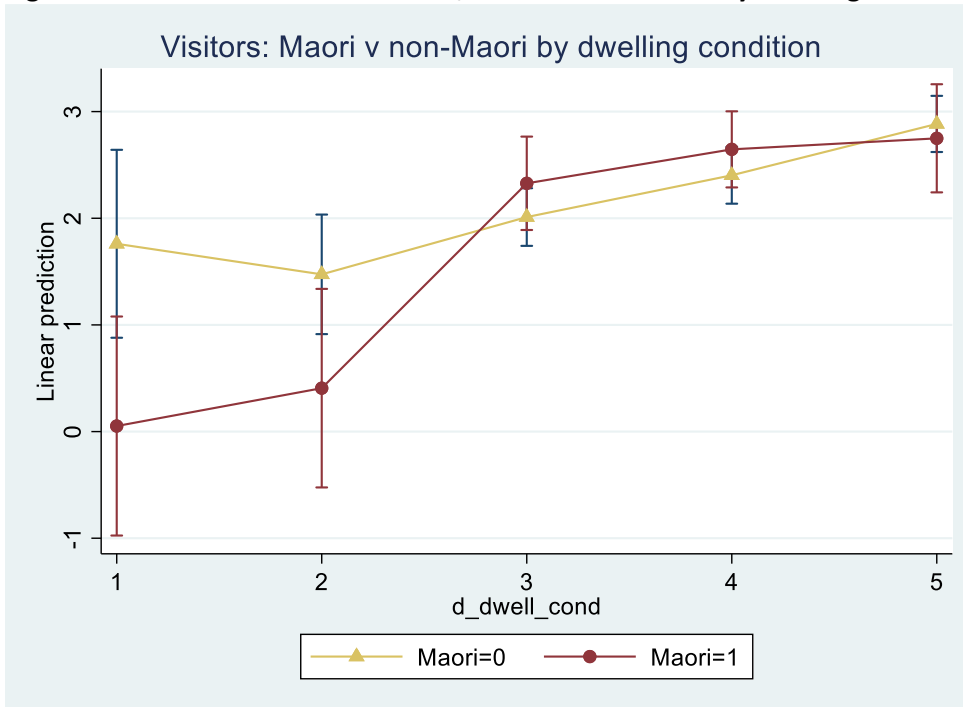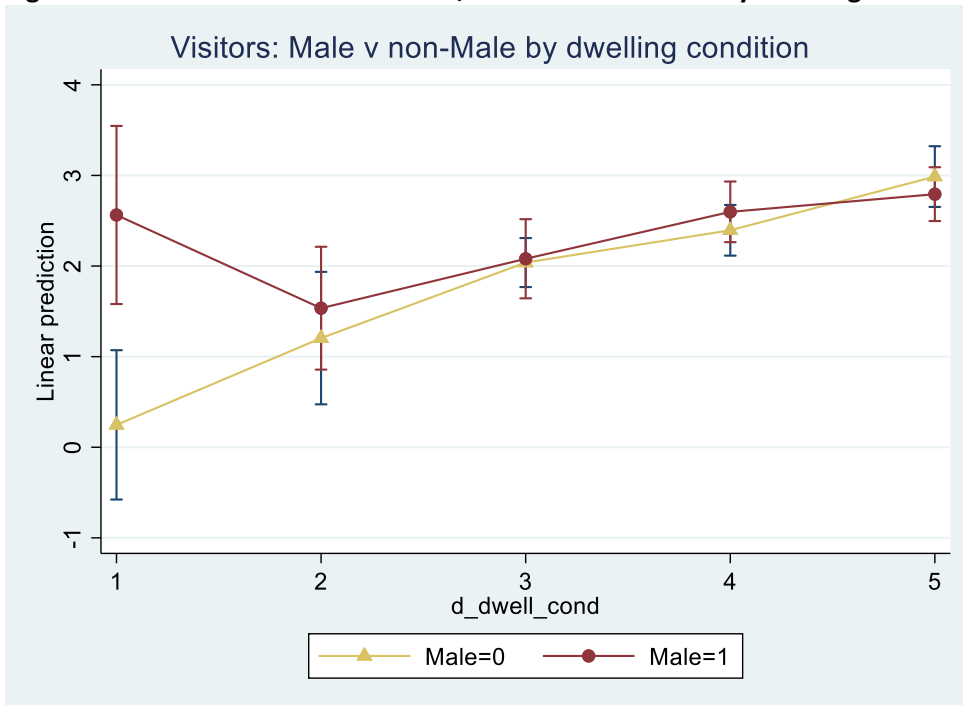

Notes: "Linear prediction" is predicted values for Visitors (measured on a scale of 0: "I try to avoid having visitors because of the state or condition of my house" to 4: "I'm proud of my house and feel happy to have people visit" ; "d_dwell_cond" refers to the question: How would you describe the condition of your dwelling?" with answers ranging from 1: "very poor" to 5: "excellent". Predictions are based on holding other variables at their means.

Figure 4: Predicted values for *Visitors*, Males vs non-Males by dwelling condition

Notes: "Linear prediction" is predicted values for Visitors (measured on a scale of 0: "I try to avoid having visitors because of the state or condition of my house" to 4: "I'm proud of my house and feel happy to have people visit" ; "d_dwell_cond" refers to the question: How would you describe the condition of your dwelling?" with answers ranging from 1: "very poor" to 5: "excellent". Predictions are based on holding other variables at their means.

6: Conclusions

The micro-geography of people's wellbeing depends not just on the characteristics of their house and neighbourhood – though these characteristics are undoubtedly important – but also on their form of tenancy. Identical twins may reside next door to each other in identical houses with an identical neighbourhood, but if one is in a secure form of tenancy and the other has insecure tenure, their appreciation of those characteristics, and their overall wellbeing, may differ markedly. Thus, analyses of the micro-geography of wellbeing should consider the forms and the security of residents' tenure in addition to their local characteristics.

We utilise a survey administered to residents in public rental housing, private rentals and owner-occupiers in New Zealand to analyse the micro-geographic factors that influence their wellbeing. We concentrate on a sample of residents in the Wellington urban area; the majority of the sample are public housing tenants; those in the sample who are private rental tenants or owner-occupiers reside in the same area as some of the public housing respondents. The survey data enable us to focus on the association between residents' subjective wellbeing and their tenure type, house characteristics and neighbourhood characteristics. Our principal wellbeing proxies are the *WHO-5* measure of mental wellbeing (an affect measure relating to the previous two weeks) and *Life satisfaction* (an evaluative subjective wellbeing measure).

We find a strong association between tenure type and wellbeing. Specifically, we find that residents in public housing have higher wellbeing than do those in private tenancies. This association occurs despite selection effects (for public housing tenants) which are likely to bias findings in the other direction. Furthermore, public housing tenants have similar wellbeing outcomes to owner-occupiers, again despite the selection effects pertaining to public housing residents. Further results indicate that length of tenure explains much of the difference we see between public and private tenants; when private tenants have been in the same house for a long period (one to two decades), they have similar wellbeing to that experienced by public tenants. Hence security of tenure – which differs markedly under New Zealand law for private versus public housing tenants – is a strong candidate for explaining the observed wellbeing differences between renters in public and private housing.

In addition to tenure type, we find evidence that wellbeing is affected by perceptions of house suitability and neighbourhood suitability. In turn, house suitability reflects dwelling condition, cold and dampness. Neighbourhood suitability reflects the importance of social capital and of living in a safe area. An important methodological finding is that some of these characteristics are more important for certain population groups than for others. For instance, it is estimated that, relative to other ethnicities, Māori place greater importance on dwelling condition when judging whether they are comfortable in inviting visitors to their house. Males, in contrast, place less emphasis (on average) on dwelling condition than do other genders. A lesson from these results is that the relevance for wellbeing of certain micro-geographic factors may vary across population groups, so care needs to be taken in generalising findings related to the association of wellbeing and micro-geographic factors across groups.

At a policy level, our results are important in establishing that the public housing programmes covered by our sample of houses – which include public housing provided by central government, local government and Community Housing Providers – are very likely having substantial positive impacts on tenant wellbeing. Public housing quality is higher than that of private rentals (in our sample), but these differences do not fully explain the wellbeing gap, which is likely also to reflect differences in security of tenure. Housing developments that can offer high degrees of neighbourhood safety and which promote social capital through community development are likely to boost wellbeing still further.

While public housing tenants have considerably lower incomes than do private tenants (or owner-occupiers) in our sample, our results do not depend on the nature (and hence degree) of rental assistance received by residents. Instead, the strongest indication of why public housing tenants have higher wellbeing than do private tenants is related to security of tenure. This finding suggests that policy consideration should be given not just to provision of public housing, ensuring adequate dwelling condition and promoting community development, but also to adopting tenancy laws that enhance security of tenure for those in private rentals.

References

Allison R, Foster J. 2004. Measuring health inequality using qualitative data. *Journal of Health Economics*, 23, 505-524.

Amore K, Viggers H, Howden-Chapman P. 2021. Severe housing deprivation in Aotearoa New Zealand, 2018 - June 2021 update. He Kāinga Oranga / Housing & Health Research Programme - Department of Public Health, University of Otago Wellington, Wellington.
https://www.hud.govt.nz/assets/Uploads/Documents/Severe-Housing-Deprivation-2018-Estimate-Report.pdf

Anastasiadis S, Anwar N, Benny V, Lee W, MacCormick C, Smith C, Vandenbroucke B. 2018. Measuring the wellbeing impacts of public policy: social housing. Using linked administrative and survey data to evaluate the wellbeing impacts of receiving social housing. *Social Investment Agency Working Paper SIA-2018-0105.*

Bergstrom K, Grimes A, Stillman S. 2014. Does selling state silver generate private gold? Neighbourhood impacts of state house sales. *Urban Studies*, 51(6), 1257-1273.

Bloem R, Oswald A. 2022. The analysis of human feelings: a practical suggestion for a robustness test. *Review of Income and Wealth*, 68(3), 689-710.

Bond T, Lang K. 2019. The Sad Truth about Happiness Scales. *Journal of Political Economy*, 127 (4), 1629–40.

Carlin R, Love G, Smith C. 2017. Measures of interpersonal trust: Evidence on their cross-national validity and reliability based on surveys and experimental data. OECD Statistics Working Papers, No. 2017/10, OECD Publishing, Paris.

Chisholm E, Robertson O, Howden-Chapman P, Pierse N. 2022. Does the proportion of public housing tenants in a community affect their wellbeing? Results from New Zealand: A retrospective cohort study using linked administrative data. *Cities*, 131, 103916.

Chisholm E, Olin C, Randal E, Witten K, Howden-Chapman P. 2023. Placemaking and public housing: the state of knowledge and research priorities, *Housing Studies*. DOI:10.1080/02673037.2023.2206799.

Dillman D, Smyth J, Christian L. 2009. *Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method*, 3rd ed. New Jersey, John Wiley & Sons Inc.

Dolan P, Peasgood T, White M. 2008. Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology*, 29, 94–122.

Fleming D, Grimes A, Lebreton L, Maré D, Nunns P. Valuing sunshine. *Regional Science and Urban Economics*, 68, 268-276.

Frijters P, Krekel C. 2021. *A Handbook for Wellbeing Policy-Making: History, Theory, Measurement, Implementation, and Examples*. Oxford University Press.

Fujiwara D. 2013. *The social impact of housing providers*. UK, Housing Associations Charitable Trust (HACT).

Fyfe C, Grimes A, Minehan S, Taptiklis P. 2022. *Evaluation of the Warmer Kiwis Homes Programme: Full Report including Cost Benefit Analysis*. Motu Working Paper 22-14, Wellington: Motu Research.

Grimes A, White D. 2019. Digital inclusion and wellbeing in New Zealand. Motu WP19-17. Wellington: Motu.

Harris P, Taylor R, Minor B, Elliott V, Fernandez M, O'Neal L, McLeod L, Delacqua G, Delacqua F, Kirby J, Duda S. 2019. The REDCap consortium: Building an international community of software platform partners. *Journal of Biomedical Informatics*, 95, 103208. https://doi.org/10.1016/j.jbi.2019.103208

Harris P, Taylor R, Thielke R, Payne J, Gonzalez N, Conde J. 2009. Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, 42, 377-381. https://doi.org/10.1016/j.jbi.2008.08.010

Howden-Chapman P, Fyfe C, Keall M, Riggs L, Pierse N. 2021. The effects of housing on health and well-being in Aotearoa New Zealand. *New Zealand Population Review*, 47, 16-32.

Howden-Chapman P, Bennett J, Edwards R, Jacobs DE, Nathan K, Ormandy D. 2023. Review of the impact of housing quality on inequalities in health and wellbeing. *Annual Review of Public Health*, 44.

Howden-Chapman P, Crane J, Keall M, et al. 2023. He Kāinga Oranga: 25 years of measuring how better housing can improve health, wellbeing and sustainability. Journal of the Royal Society of New Zealand, forthcoming. https://doi.org/10.1080/03036758.2023.2170427

Hyslop D, Rea D. 2019. Do housing allowances increase rents? Evidence from a discrete policy change. *Journal of Housing Economics*, 46, 101657. https://doi.org/10.1016/j.jhe.2019.101657

Kourtit K, Nijkamp P, Wahlstrom M. 2021. How to make cities the home of people – a 'soul and body' analysis of urban attractiveness. *Land Use Policy*, 111, 104734.

Lawson-Te Aho K, Fariu-Ariki P, Ombler J, Aspinall C, Howden-Chapman P, Pierse N. 2019. A principles framework for taking action on Māori/Indigenous Homelessness in Aotearoa/New Zealand. *SSM - Population Health*, 8, 100450.

Majid W. 2023. Can landlords siphon housing allowances? New theory and evidence on housing allowance algorithms from a natural experiment. *Journal of Housing Economics*, 61, 101948. https://doi.org/10.1016/j.jhe.2023.101948

MHUD. 2023. *March 2023 Public Housing Quarterly Report.* Wellington, Ministry of Housing and Urban Development.

MSD. 2022. *Requirements of priority A and B of the housing register point system*. Wellington, Ministry of Social Development. https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/official-information-responses/2022/june/14062022-requesting-the-requirements-of-priority-a-and-b-of-the-housing-register-point-system-and-how-these-assessments-are-made.pdf.

OECD. 2011. *How's Life? Measuring Wellbeing*. OECD Publishing, Paris.

O'Sullivan K, Howden-Chapman P, Fougere G, Hales S, Stanley J. 2013. Empowered? Examining self-disconnection in a postal survey of electricity prepayment meter consumers in New Zealand. *Energy Policy*, 52, 277-287. http://dx.doi.org/10.1016/j.enpol.2012.09.020

Penny G, Logan A, Olin C, O'Sullivan K, Robson B, Pehi T, Davies C, Wall T, Howden-Chapman P. Forthcoming. A Whakawhānaungatanga Māori Wellbeing Model for Research and Development of Housing and Urban Environments.

Riggs L, Keall M, Howden-Chapman P, Baker MG. 2021. Environmental burden of disease from unsafe and substandard housing, New Zealand, 2010-2017. *Bulletin of the World Health Organization*, 99(4), 259-270.

Sen A. 1999. *Development as Freedom*. New York: Alfred A. Knopf.

Smith C, Davies C. 2020. *Valuing wellbeing outcomes: Cost-wellbeing analysis of housing outcomes in the New Zealand General Social Survey*. Wellington: Kotata Insight.

Stats NZ. 2020. *Housing in Aotearoa*. Wellington: Statistics New Zealand. https://www.stats.govt.nz/reports/housing-in-aotearoa-2020

The Treasury. 2022. *Te Tai Waiora: Wellbeing in Aotearoa New Zealand*. Wellington, The Treasury.

Torshizian E, Grimes A. 2021. Household crowding measures: A comparison and external test of validity. *Journal of Happiness Studies*, 22, 1925-1951.

Van Praag B, Frijters P, Ferrer-i-Carbonell A. 2003. The anatomy of subjective well-being. *Journal of Economic Behavior and Organization*, 51(1), 29-49.

Wright-St Clair V, Neville S, Forsyth V, White L, Napier S. 2017. Integrative review of older adult loneliness and social isolation in Aotearoa/New Zealand. *Australasian Journal on Ageing*, 36(2), 114-123.

Appendix 1: Survey administration details

To administer the survey on which our analysis is based, housing providers first shared address details, cross referenced with a unique ID for each property, with a third-party mailing company that the research team engaged to undertake the mailout. Mail items contained the unique ID, so that it was possible to complete the survey or withdraw anonymously, and the research team or the mailing company could remove addresses from the mailout list if mail was returned so that they were not sent further reminders. This protocol consisted of a prenotification postcard co-branded by the provider and research team informing households to expect a research survey pack sent in Week 1 on Day 1, with the first survey pack sent on Day 3 including: a letter of introduction from the provider; a cover letter from the research team; a hardcopy of the survey booklet; and a prepaid return envelope that would return the survey to the research team. A reminder postcard was sent in Week 3. A complete second survey pack, with cover letters altered to remind participants to respond, was sent in Week 5. A complete third survey pack, with cover letters altered to alert participants that this was their final opportunity to complete the survey and return it, was sent in Week 7. Adjustments were made to the schedule as needed to accommodate delays in mail delivery due to a wave of COVID-19.

Variations to the standard protocol were requested from two housing providers: one preferred that the initial introduction letter be sent solely from the housing provider (instead of the planned co-branding) and then for all other survey correspondence to be branded/addressed only from the research team; and another asked for only one survey packet to be sent per household (rather than the maximum of three). In one geographically-bound neighbourhood area known to have a relatively high number of public houses, the standard protocol was followed and sent to all 1542 addresses held by New Zealand Post. Surveys to these addresses gained information on home ownership/tenure status to allow comparisons of wellbeing between those living in public, private rental, and owner-occupied housing types.

Participants had the option to fill out the survey online, on paper using the prepaid return envelope, or free-phoning our research team for researcher-assisted survey completion. Only one survey was accepted per household, and where two were received the first was used. Households that returned a survey were offered a $25 supermarket gift card sent after the survey was received. Online surveys were completed on the REDCap survey platform (Harris et al., 2009; Harris et al., 2019) and paper hardcopies of the questionnaire were manually entered. Prior to analysis, data was fully deidentified using ID codes.

As part of the survey, participants were asked whether they consented to be sent an indoor environment datalogger measuring temperature and relative humidity and for permission for the researchers to contact them to ask them to be involved in further research within the broader programme.[39]

A total of 2,580 surveys were posted to addresses, of which 148 were returned as "Gone no address" or "Return to Sender" (mostly from a neighbourhood area which was undergoing significant urban renewal with several houses demolished for new developments). With a final sample of 575 (excluding 'quality flag' responses), the survey response rate was 23.6%.

---

[39] The survey data will be integrated with other data from across the research programme, including a follow-up tenancy survey in 2024, an experienced wellbeing survey (to gain data on momentary affect), the quality of buildings, indoor environmental monitoring, energy use, a transport survey, and qualitative data on governance and management of the public housing providers, plus tenant and community experiences.

Appendix 2

Appendix 2a: Subjective wellbeing and material wellbeing variables

The questions (in italics) and response categories relating to subjective wellbeing and to *Income meets needs* are as follows:

Life satisfaction
First of all, I am going to ask you a very general question about your life as a whole these days. This includes all areas of your life. Looking at the showcard below, where zero is completely dissatisfied, and ten is completely satisfied, how do you feel about your life as a whole?

( ) 0 Completely dissatisfied, …, (10) Completely satisfied.

WHO-5
Please indicate for each of the five statements which is closest to how you have been feeling over the last two weeks. Over the last two weeks...

	All of the time	Most of the time	More than half of the time	Less than half of the time	Some of the time	At no time
I have felt cheerful and in good spirits?	( )	( )	( )	( )	( )	( )
I have felt calm and relaxed?	( )	( )	( )	( )	( )	( )
I have felt active and vigorous?	( )	( )	( )	( )	( )	( )
I woke up feeling fresh and rested?	( )	( )	( )	( )	( )	( )
My daily life has been filled with things that interest me?	( )	( )	( )	( )	( )	( )

Whānau wellbeing
I'd like you to think in general about how your family/whānau is doing. Please include all areas of life for your family/whānau. Your family/whānau is the group of people that you think of as your family or whānau. Where zero means 'extremely badly' and ten means 'extremely well', how would you rate how your family/whānau is doing these days?

( ) 0 Extremely badly, …, ( ) 10 Extremely well.

Control over life

Some people feel that they have complete control over their lives, while other people feel that what they do has no real effect on what happens to them. Looking at showcard 2.2 where zero is 'no control at all' and ten is 'complete control', how much control do you feel you have over the way your life turns out?

( ) 0 No control at all, …, ( ) 10 Complete control.

Loneliness

People who have contact with family and friends can still feel lonely sometimes, while those who have little contact may not feel lonely at all. In the last four weeks, how much of the time have you felt lonely?

( ) none of the time; ( ) a little of the time; ( ) some of the time; ( ) most of the time; ( ) all of the time.

Income meets needs

How well does your total household income meet your everyday needs, for such things as accommodation, food, clothing, and other necessities?

( ) not enough money; ( ) only just enough money; ( ) enough money; ( ) more than enough money.

Equivalised household income

Equivalised household income is constructed as the sum of household income from all sources divided by the square root of number of household members.

Appendix 2b: *Visitors, Home suits, Area suits* variables

The questions (in italics) and response categories relating to *Visitors*, *Home suits* and *Area suits* are as follows:

Visitors

How do you feel when visitors come to your house?
( ) I try to avoid having visitors because of the state or condition of my house;
( ) I feel a little shy about the state or condition of my house;
( ) I feel ok about the house and having visitors here;
( ) I'm pleased to have visitors and don't feel shy about my house;
( ) I'm proud of my house and feel happy to have people visit.

Home suits

How much do you agree that the type of home you live in suits your needs and the needs of others in your household?
( ) strongly agree; ( ) agree; ( ) neither agree nor disagree; ( ) disagree; ( ) strongly disagree.

Area suits

How much do you agree or disagree that the general area or neighbourhood your home is in suits your needs and the needs of others in your household?
( ) strongly agree; ( ) agree; ( ) neither agree nor disagree; ( ) disagree; ( ) strongly disagree.

Appendix 3: Relationships between *Income meets needs*, equivalised household income, and receipt of income related rent subsidy (IRRS)

We hypothesise, *ceteris paribus*, that people in higher income households are more likely to respond on a higher step of the *Income meets needs* question than do people in lower income households. After controlling for income, we also expect that people in receipt of an income related rent subsidy (IRRS) will answer on a higher step of *Income meets needs* than those without an IRRS since their rental costs are reduced for a given level of income relative to those not on an IRRS.

To examine these hypotheses, Table A3.1 presents average equivalised household income (*HH_Income*) for Wellington respondents according to their responses for *Income meets needs*. (The sample is restricted to Wellington to enable comparability within an urban area, so abstracting from differing costs across different cities; responses for the full sample are very similar to those for the Wellington sample.)

Two clear gradients are apparent in Table A3.1. First, as expected, mean *HH_Income* rises across the *Income meets needs* categories for every tenancy type. Second, other than two small exceptions, for each *Income meets needs* category, *HH_Income* is highest for owner-occupiers, followed respectively by private tenants, public tenants without IRRS and finally public tenants with IRRS. This second gradient indicates the expected *HH_Income* gradient by tenancy type (public tenant, private tenant, owner-occupier), but also indicates that *HH_Income* is higher, on average, for public tenants without IRRS than for tenants with IRRS. This finding implies that, within our sample, poorer tenants are more likely to be with public housing providers that are eligible for an IRRS than those which are not eligible for an IRRS.

We investigate the relationship between *Income meets needs*, *HH_Income* and IRRS eligibility more formally by regressing *Income meets needs* on the other two variables for the Wellington sample including all public and private tenants; the full sample gives similar results, as does a restricted sample of just public tenants. (A sample which drops 18 observations with very low equivalised incomes also produces very similar results.) Table A3.2 presents the results using both OLS and ordered logit (Ologit) regression with odds ratios reported.

Table A3.1: Mean *HH_Income* by tenancy and IRRS for *Income meets needs* responses (Wellington)

	All categories	Not enough	Only just enough	Enough	More than enough*
Public tenants All	17663	13106	17153	23766	43135
Public tenants IRRS: No	22650	17471	20632	30037	61237
Public tenants IRRS: Yes	15575	11683	15598	20825	36203
Private tenants	30884	17856	30083	44869	57394
Owner-occupiers	40171	22571	38239	44285	108023

* Mean *HH_Income* in the *More than enough* category should be treated with considerable caution due to low numbers (2 public tenants with IRRS: No; 4 public tenants with IRRS: Yes; 3 private tenants; 4 owner-occupiers).

In each case, we see that the response category for *Income meets needs* rises as *HH_Income* rises across the sample; in other words, households with higher income find it easier to meet their household material needs than do poorer households. As hypothesised, the coefficient on IRRS in the OLS regression is positive (and the odds ratio is greater than one in the ordered logit regression) but the variable is not statistically significant. At least three possible explanations present themselves for the lack of significance of the IRRS term. First, across our sample, income related rents may not be materially different to the rents paid by tenants without an IRRS, potentially because the public housing provider (WCC) may charge below-market rents. Second, the accommodation supplement (AS) received by those who are not eligible for an IRRS may compensate, at least in part, for the lack of an IRRS. Third, respondents who are tenants of eligible providers may have greater material needs than do other tenants and the IRRS may be just compensating those tenants for their greater material needs.

Table A3.2: *Income meets needs* regressed on *HH_Income* and *IRRS* (Wellington, public and private tenants)

VARIABLES	OLS	Ologit
HH_Income (log)	0.502***	3.438***
	(0.067)	(0.654)
IRRS	0.104	1.261
	(0.095)	(0.302)
Constant	-3.966***	
	(0.672)	
Observations	275	275
R-squared/ pseudo-squared	0.171	0.075

Notes: Dependent variable *is Income meets needs. HH_Income* is the logarithm of equivalised house income, *IRRS* is a dummy variable for eligibility income related rents. OLS estimates and ordered logit estimates (with odds ratios reported) respectively. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Appendix 4: Formulation of principal components

In order to control for a wide variety of personal, house and neighbourhood characteristics, the survey data (excluding demographic characteristics) were summarised by calculating 11 principal components based on 42 survey questions. Formulation of the principal components (PCs) began with a researcher-driven specification of groups into which conceptually related variables were included.

Initially, an extended set of variables was examined relating to the respondent's house. Inspection of loadings for PCs calculated from this extended set of variables indicated distinct combinations which resulted in splitting this set of variables into three separate groups and forming principal components based on these three separate groups.

The first group comprised variables relating to cold, damp and mould; the first two PCs calculated from these variables were retained, with loadings indicating that they related primarily to cold and damp respectively (pc1c, pc2c).[40]

The second group related to house suitability from which one PC (pc1b) was retained.

The third group comprised variables related to dwelling condition and heating options, from which two PCs were retained (pc1h, pc2h).

The fourth group comprised variables related to the respondent's neighbourhood and sense of belonging to various communities (whānau, neighbourhood, New Zealand), resulting in retention of a single PC (pc1n).

The fifth group comprised variables relating to material wellbeing of the respondent, with a single PC being retained (pc1m).

The sixth group comprised variables relating to spiritual and cultural aspects of life, resulting in three PCs. The first PC (pc1s) had high loadings on the importance of Māori culture; the second (pc2s) had high loadings on whether the respondent reported being discriminated against and whether they felt able to be themself in New Zealand; the third (pc3s) had a high loading on the importance of spirituality.

---

[40] The variables included in each PC group are listed below. The number of PCs chosen from each group of variables was in part driven by the eigenvalues (which had to exceed one) and in part by observing whether the grouping had a logical interpretation as having high loadings on conceptually related variables.

The seventh group comprised variables relating to public transport, each of which had high loadings in the single PC (pc1p).

The question numbers in the survey[41] for the variables comprising each PC group are shown below, with the corresponding question wording included at the end of this appendix. The wording in square brackets following each provides a concise description of the nature of variables that have high loadings within that PC.

Group 1: Questions: 6, 7, 8, 10, 11
　　　　PCs:　　pc1c [cold house]; pc2c [damp house]

Group 2: Questions: 13, 14, 69
　　　　PCs:　　pc1b [house suitability]

Group 3: Questions: 5, 9, 12, 54
　　　　PCs:　　pc1h [dwelling condition], pc2h [heating type]

Group 4: Questions: 55, 57, 58, 63, 72, 73
　　　　PCs:　　pc1m [material wellbeing]

Group 5: Questions: 15, 30, 31, 32, 33, 35, 36, 37, 47, 53, 64, 65
　　　　PCs:　　pc1n [neighbourhood and social capital]

Group 6: Questions: 44, 45, 46, 48, 49, 50, 51, 52
　　　　PCs:　　pc1s [Māori culture]; pc2s [discrimination] ; pc3s [spirituality]

Group 7: Questions: 39, 40, 41, 42, 43
　　　　PCs:　　pc1p [public transport]

In interpreting the PCs, it is important to note that they summarise associations between the variables within the relevant group; they do not indicate that the variables with high loadings necessarily affect the dependent variable in an equation to which the PC is added. The PCs are used simply to summarise respondents' answers to a wide range of survey questions so that these factors are controlled for when testing for the association between the dependent variable and other explanatory variables in that regression. The weighting of the variables within each PC of a given group is driven by the correlations amongst the variables and not by researcher-imposed decisions (other than through the initial choice of groups).

The wording in the survey for each variable included in the principal components is as follows:

---

[41] https://www.sustainablecities.org.nz/our-research/current-research/public-housing-urban-regeneration-programme/tenant-wellbeing-survey

5) How would you describe the condition of your dwelling?

6) In winter, is your house or flat colder than you would like?

7) Can you see mould in any part of this dwelling, in total, is larger than an A4 sheet of paper?

8) Would you say this house or flat is always damp, sometimes damp or not damp at all?

9) Which types of heating are used most often in this dwelling?

10) In winter, does your house or flat get cold enough that you can see your breath?

11) In winter, does your house or flat get cold enough that you shiver indoors?

12) Do you feel your house is too warm in the summer?

13) How do you feel when visitors come to your house?

14) How much do you agree that the home you live in suits your needs and the needs of others in your household?

15) How much do you agree or disagree that the general area or neighbourhood your home is in suits your needs and the needs of others in your household?

30) How would you describe your sense of belonging to your family or whānau?

31) How would you describe your sense of belonging to your neighbourhood?

32) How would you describe your sense of belonging to New Zealand as a whole?

33) Thinking now about the social networks and groups you may be part of, do you belong to the following? [12 choices given]

35) Imagine you were away and needed help with things like collecting mail, looking after pets, or checking your home. How easy or hard would it be to find someone to help?

36) Suppose you urgently needed a place to stay. How easy or hard would it be to ask someone you know to stay with them?

37) From where you live, how easy or difficult is it for you to get to a public park or green space?

39) In your local area, public transport is affordable.

40) In your local area, public transport is safe.

41) In your local area, public transport is easy to get to.

42) In your local area, public transport is frequent (comes often).

43) In your local area, public transport is reliable (comes on time).

44) Thinking about your life as a whole, how important is it for you to be involved in things to do with Māori culture?

45) Have you ever been to a marae?

46) About how many times have you been to a marae in the last 12 months?

47) In the last four weeks, did you provide any help without pay for a school, church, sports club, marae, hapu, iwi or any other group or organisation?

48) How important is spirituality in your life?

49) How often do you attend religious worship services?

50) People in New Zealand have different lifestyles, cultures, and beliefs, that express who they are. How easy or hard is it for you to be yourself in New Zealand?

51) In the last 12 months, have you been discriminated against?

52) What situation or situations were you in when you were discriminated against?

53) Did you vote in New Zealand's last general election?

54) Which of these are available here in this dwelling?

55) Do you use appliances at a particular time of day because the price of electricity is cheaper then?

57) How well does your total household income meet your everyday needs, for such things as accommodation, food, clothing, and other necessities?

58) In the last 12 months, have you not paid electricity, gas, rates, or water bills on time, because of a shortage of money?

63) Work in the household includes things like cleaning, shopping, preparing meals, and caring for others in your household. In the last four weeks how do you feel about this household work?

64) Now, thinking about crime, how safe or unsafe do you feel walking alone in your neighbourhood after dark?

65) In general how much do you trust most people in New Zealand?

69) How many bedrooms does this house/apartment have?

72) Select as many options as you need to show all the ways you or anyone in your household got income in the 12 months ending today. Don't count loans because they are not income.

73) In the last 12 months, what was your total household income, before tax or anything else was taken out?

Appendix 5: Additional summary statistics

Table A5.1: Summary statistics for demographic variables and additional variables in Table 6 and Table 7 (main Wellington sample)

Variable	Mean
Age band	
18-24 years	0.01
25-34 years	0.10
35-44 years	0.17
45-54 years	0.17
55-64 years	0.25
65-74 years	0.17
75+ years	0.11
Ethnicity	
NZ European	0.47
Māori	0.26
Pacific	0.26
Asian	0.02
Other	0.15
Gender	
Female	0.61
Male	0.38
Alternative gender	0.01
Household structure	
Under 5 year olds present	0.08
5 – 17 year olds present	0.29
Household size	2.52
Self-assessed overall health (note 1)	
Poor	0.08
Fair	0.25
Good	0.36
Very good	0.23
Excellent	0.08
Long-term illness (note 2)	
No	0.75
Yes	0.21
Disability (Washington scale, Level 3) (note 3)	
No	0.80
Yes	0.19
Employment status	
Employed full-time	0.26
Employed part-time	0.15
Not in paid employment & looking for work	0.14
Not in paid employment & not looking for work	0.45
Occupancy length	
Number of years in current house	11.6
Dwelling condition	
Very poor	0.04
Poor	0.07
Average	0.31
Good	0.36
Excellent	0.23

Damp House	
No	0.55
Sometimes	0.36
Always	0.09
Shiver indoors in winter	
No	0.56
Yes	0.43
Heater in house	
No	0.05
Yes	0.95
Too warm in summer	
No	0.24
Sometimes	0.47
Often	0.16
Always	0.13
Ease of help when away (note 4)	
Very hard	0.07
Hard	0.08
Some	0.30
Easy	0.26
Very easy	0.27
Safety of neighbourhood when walking at night	
Very unsafe	0.10
Unsafe	0.18
Neither safe nor unsafe	0.30
Safe	0.31
Very safe	0.10
Belong to neighbourhood (0-10 scale)	5.89
Belong to whānau (0-10 scale)	7.88
Number of networks (out of 9 listed)	1.94

Notes: Means of categorical variables represent proportions of sample; "missing observations" equal to 1- sum of proportions in group; sum of ethnicities >1 as people can report multiple ethnicities.

Survey questions (where not obvious above) are as follows:

1. "In general, would you say your health is excellent, very good, good, fair, or poor?"
2. "Does anyone in the household suffer from long-term illness that requires extra energy use (like extra heating, or laundry, or medical equipment such as dialysis)?"
3. The Washington Short set disability scale Level 3 is based on 6 questions relating to difficulty in seeing, hearing, walking or climbing steps, remembering or concentrating, washing all over or dressing, and communicating using your usual language.
4. "Imagine you were away and needed help with things like collecting mail, looking after pets, or checking your home. How easy or hard would it be to find someone to help?"

Appendix 6: Additional estimates

The tables and figures in this appendix detail results of robustness checks discussed in section 5.

Table 4-1: Wellbeing metrics regressed on tenancy status (Wellington, no controls; ordered logit)

VARIABLES	WHO-5	Life-satisfaction	Control	Whānau-wb	Loneliness
Tenancy status					
Public rental (base)					
Private rental	-0.854***	-0.403	-0.346	-0.271	-0.182
	(0.292)	(0.258)	(0.291)	(0.274)	(0.321)
Owner-occupier	-0.268	0.314	0.235	0.224	-0.697***
	(0.196)	(0.195)	(0.188)	(0.197)	(0.210)
Observations	386	400	396	392	400
Pseudo R-squared	0.004	0.003	0.002	0.001	0.009
Controls	NO	NO	NO	NO	NO

Notes: Ordered logit estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4-2: Binary WHO-5 and Life satisfaction variables regressed on tenancy status (Wellington, no controls; OLS, probit and logit)

VARIABLES	WHO5_med OLS	WHO5_med probit	WHO5_med logit	LS_med OLS	LS_med probit	LS_med logit
Tenancy status						
Public rental (base)						
Private rental	-0.169*	-0.427*	-0.683*	-0.177**	-0.495**	-0.814*
	(0.090)	(0.234)	(0.377)	(0.081)	(0.251)	(0.424)
Owner-occupier	-0.052	-0.131	-0.209	0.102*	0.258*	0.412*
	(0.060)	(0.151)	(0.241)	(0.060)	(0.151)	(0.242)
Observations	404	404	404	404	404	404
(Pseudo-)R-squared	0.009	0.007	0.007	0.020	0.015	0.015
Controls	NO	NO	NO	NO	NO	NO

Notes: WHO5_med is a binary variable =1 if WHO-5 >80 (54% of observations) and =0 otherwise (46% of observations). LS_med is a binary variable =1 if Life-satisfaction >7 (43% of observations) and =0 otherwise (57% of observations). Estimation technique indicated in second row. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5-1: WHO-5 regressed on tenancy status (with controls; ordered logit)

VARIABLES	Eqn (2)	Eqn (3)	Eqn (4)	Eqn (5)	Eqn (5)
Sample	All	All	All	All	Public
Tenancy status					
Public rental (base)					
Private rental	-0.789*	-0.805*	-1.063**	-1.018**	
	(0.408)	(0.416)	(0.455)	(0.427)	
Owner occupier	-0.256	-0.376	-0.351	-0.337	
	(0.269)	(0.279)	(0.278)	(0.269)	
Home suits					
Strongly disagree (base)					
Disagree			-0.532		
			(0.576)		
Neither agree nor disagree			-0.418		
			(0.486)		
Agree			0.056		
			(0.451)		
Strongly agree			0.524		
			(0.510)		
Visitors					
Avoid due to house condition (base)					
Feel a little shy				1.179***	1.122*
				(0.433)	(0.582)
Feel okay				0.899**	0.655
				(0.394)	(0.522)
Feel pleased (not shy)				1.338***	0.700
				(0.423)	(0.537)
Proud of my house				1.194***	1.422**
				(0.462)	(0.617)
Area suits					
Strongly disagree (base)					
Disagree			-0.135	-0.209	-0.303
			(0.762)	(0.697)	(0.917)
Neither agree nor disagree			1.178	1.088	1.318*
			(0.768)	(0.682)	(0.782)
Agree			1.229*	1.326*	1.743**
			(0.740)	(0.687)	(0.806)
Strongly agree			1.878**	2.212***	2.339***
			(0.788)	(0.729)	(0.869)
Observations	376	376	376	376	258
Pseudo R-squared	0.095	0.103	0.116	0.118	0.136
Demographic controls	YES	YES	YES	YES	YES
Other personal controls	YES	YES	YES	YES	YES
House controls	NO	YES	NO	NO	NO
Neighbourhood controls	NO	YES	NO	NO	NO

Notes: Ordered logit estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Wald tests for column 3: Home suits χ^2 = 8.91*, Area suits χ^2 = 18.45***.
Wald tests for column 4: Visitors χ^2 = 10.94**, Area suits χ^2 = 32.36***.
Wald tests for column 5: Visitors χ^2 = 6.68, Area suits χ^2 =22.93***.

Table 5-2: Life satisfaction regressed on tenancy status (with controls; OLS)

VARIABLES	Eqn (2)	Eqn (3)	Eqn (4)	Eqn (5)	Eqn (5)
Sample	All	All	All	All	Public
Tenancy status					
Public rental (base)					
Private rental	-0.503*	-0.461	-0.640**	-0.509*	
	(0.301)	(0.304)	(0.317)	(0.302)	
Owner occupier	-0.165	-0.194	-0.309	-0.240	
	(0.308)	(0.326)	(0.304)	(0.295)	
Home suits					
Strongly disagree (base)					
Disagree			-0.427		
			(0.749)		
Neither agree nor disagree			0.074		
			(0.696)		
Agree			0.466		
			(0.670)		
Strongly agree			0.234		
			(0.716)		
Visitors					
Avoid due to house condition (base)					
Feel a little shy				0.922**	0.652
				(0.415)	(0.545)
Feel okay				0.698**	0.409
				(0.331)	(0.422)
Feel pleased (not shy)				1.355***	0.980**
				(0.366)	(0.480)
Proud of my house				0.983**	0.890*
				(0.411)	(0.538)
Area suits					
Strongly disagree (base)					
Disagree			-1.513**	-1.495**	-1.831**
			(0.666)	(0.677)	(0.883)
Neither agree nor disagree			0.410	0.502	0.416
			(0.626)	(0.606)	(0.753)
Agree			0.572	0.755	0.702
			(0.602)	(0.590)	(0.743)
Strongly agree			0.950	1.058*	1.177
			(0.672)	(0.625)	(0.782)
Observations	386	386	386	386	265
R-squared	0.305	0.338	0.374	0.389	0.418
Demographic controls	YES	YES	YES	YES	YES
Other personal controls	YES	YES	YES	YES	YES
House controls	NO	YES	NO	NO	NO
Neighbourhood controls	NO	YES	NO	NO	NO

Notes: OLS estimates. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Wald tests for column 3: Home suits F=1.61, Area suits F=4.66***.
Wald tests for column 4: Visitors F=3.68***, Area suits F=5.81***.
Wald tests for column 5: Visitors F=1.36, Area suits F=4.15**.

Table 5-3: Life satisfaction regressed on tenancy status (with controls; ordered logit)

| VARIABLES	Eqn (2)	Eqn (3)	Eqn (4)	Eqn (5)	Eqn (5)
Sample	All	All	All	All	Public
Tenancy status					
Public rental (base)					
Private rental	-0.470	-0.436	-0.632*	-0.537	
	(0.304)	(0.306)	(0.345)	(0.339)	
Owner occupier	-0.196	-0.208	-0.375	-0.345	
	(0.274)	(0.297)	(0.283)	(0.274)	
Home suits					
Strongly disagree (base)					
Disagree			-0.761		
			(0.814)		
Neither agree nor disagree			-0.326		
			(0.782)		
Agree			0.095		
			(0.751)		
Strongly agree			0.218		
			(0.760)		
Visitors					
Avoid due to house condition (base)					
Feel a little shy				0.978**	0.859
				(0.445)	(0.571)
Feel okay				0.810***	0.584
				(0.306)	(0.373)
Feel pleased (not shy)				1.500***	1.168***
				(0.345)	(0.421)
Proud of my house				1.126***	1.257**
				(0.418)	(0.541)
Area suits					
Strongly disagree (base)					
Disagree			-1.581**	-1.673**	-1.748**
			(0.667)	(0.672)	(0.854)
Neither agree nor disagree			0.223	0.221	0.294
			(0.650)	(0.635)	(0.801)
Agree			0.396	0.537	0.648
			(0.626)	(0.610)	(0.799)
Strongly agree			0.592	0.832	1.023
			(0.697)	(0.658)	(0.839)
Observations	376	376	376	376	258
Pseudo R-squared	0.100	0.110	0.124	0.130	0.138
Demographic controls	YES	YES	YES	YES	YES
Other personal controls	YES	YES	YES	YES	YES
House controls	NO	YES	NO	NO	NO
Neighbourhood controls	NO	YES	NO	NO	NO

Notes: Ordered logit estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Wald tests for column 3: Home suits χ^2 = 6.49 , Area suits χ^2 = 23.20***.
Wald tests for column 4: Visitors χ^2 = 18.95***, Area suits χ^2 = 32.91***.
Wald tests for column 5: Visitors χ^2 = 9.07*, Area suits χ^2 = 18.65***.

Figure 1-1: Contrast plot for Life satisfaction, private renters v public renters by occupancy length
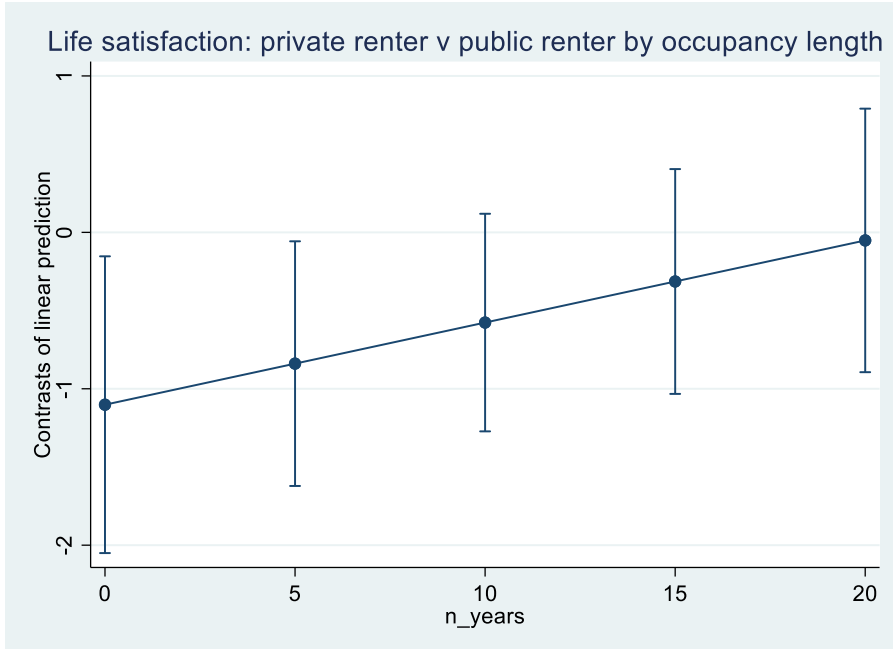
Notes: The figure contrasts the estimated *Life satisfaction* for a private renter versus a public renter according to number of years of occupancy in the current house, based on equation (6), with *Life satisfaction* as the dependent variable, with 95% confidence intervals shown (holding other variables at their means); n_years is occupancy length. The figure indicates that private renters with short tenancies have significantly lower *Life satisfaction* scores than public renters, with *Life satisfaction* scores catching up after approximately 20 years of occupancy.

Figure 2-1: Contrast plot for Life satisfaction, owner occupiers v public renters by occupancy length
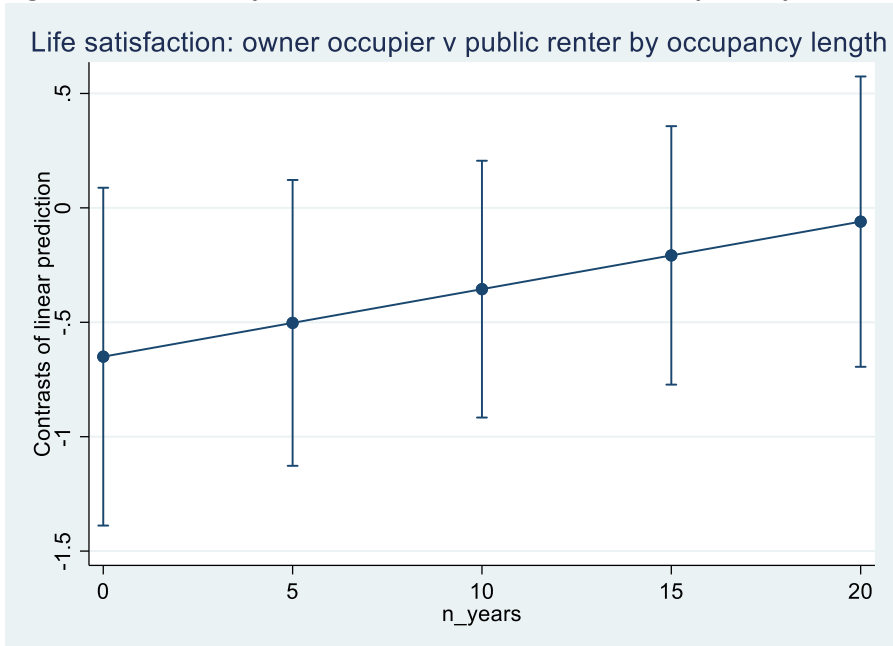
Notes: The figure contrasts the estimated *Life satisfaction* for an owner-occupier versus a public renter according to number of years of occupancy in the current house, based on equation (6), with *Life satisfaction* as the dependent variable, with 95% confidence intervals shown (holding other variables at their means); n_years is occupancy length. The figure indicates that recent owner-occupiers have *Life satisfaction* scores that are lower than those of recent public renters (not quite significant at p<0.05), with *Life satisfaction* scores catching up after approximately 20 years of occupancy.