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Housing Tenure and Subjective Wellbeing: The Importance of Public Housing

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Abstract

People's subjective wellbeing is influenced by the built environment, including housing and neighbourhood characteristics. Consistent with prior literature, we find that wellbeing is associated with the condition of a resident's house (particularly dampness and cold) and with the resident's perception of their neighbourhood (especially relating to social capital and safety). We show also that the form of tenure (public rental, private rental, owner-occupier) has a material impact on subjective wellbeing. 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.

Keywords Public housing · Tenant wellbeing · Micro-geography · House quality · Neighbourhood characteristics · Built environment

JEL Classification I31 · I38 · R23 · R28 · R38

Introduction

A shortfall of quality affordable housing in New Zealand has led to a cascade of housing-related issues with associated poor wellbeing outcomes (Howden-Chapman, Crane, et al., 2023a, 2023b). Despite its often poor quality and low energy performance, New Zealand housing is ranked the second least affordable of 41

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countries by the OECD.[1] The high cost of housing, coupled with poor quality private rental stock, has added to the demand for public (including social and community) housing.[2] Eligible households in most forms of public housing receive a subsidised rent and have greater security of tenure than is the case for private rentals. We examine subjective wellbeing (SWB) outcomes for people in public housing relative to other forms of tenure, controlling for a wide range of factors including material wellbeing. The emphasis on public housing as a separate form of tenure compared with private rentals sets this study apart from others (e.g. Elsinga & Hoekstra, 2005; Hoogerbrugge & Burger, 2024; Mouratidis, 2021; Will & Renz, 2023) which have examined the role of renter versus owner-occupier tenure status as a housing-related determinant of SWB.

Our central research question tests whether public housing is associated with higher tenant SWB relative to other forms of tenure (private rental and owner-occupation). Two subsidiary research questions test which aspects of the house and of the neighbourhood are most strongly associated with residents' SWB, and whether the relationship between tenure status and SWB differs by tenant characteristics. These subsidiary questions relate to the 'micro-geography' of wellbeing (Kourtit et al., 2021). House and neighbourhood characteristics ('body') and the personal experiences ('soul') of residents are each important in relation to these micro features. In analysing these features, researchers must define what they mean by 'neighbourhood' or 'community' when framing the analysis. Our focus is on public housing residents within the Wellington urban area,[3] with comparisons to private renters and owner-occupiers in areas adjacent to public housing.

Our study builds on the considerable literature analysing the relationship between SWB and the built environment. In summarising this literature, Mouratidis (2021) posits seven pathways through which the built environment may influence SWB: travel, leisure, work, social relationships, residential wellbeing, emotional responses, and health. Using survey evidence, we account for each of these pathways when analysing the SWB of tenants in public housing compared with that of people in other forms of housing tenure. We also account for demographic characteristics and for other influences on SWB that may be associated with the form of tenure and/or the built environment such as spirituality. Hoogerbrugge and Burger (2024) posit four pathways through which housing may affect SWB: housing tenure (renter versus owner-occupier), housing affordability, housing quality and neighbourhood quality. We extend the tenure categories to three (public renter, private renter, owner-occupier) while accounting for each of the other three pathways, with particular emphasis on house quality and neighbourhood quality.

[1] 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/.

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

[3] The Wellington urban area population (as at the 2018 census) was 414,033, with our Wellington sample being drawn from two local authorities (Wellington City and Porirua City) having a combined 2018 population of 265,983.

Our study also builds on analyses of the impacts of housing quality on health. Considerable research has been conducted within New Zealand on the effects of housing quality on health and wellbeing (Howden-Chapman, Crane, et al., 2023a, 2023b). However, there is little New Zealand or global evidence on the specific relationship of public housing to wellbeing. One New Zealand study (Chisholm et al., 2022) examined health outcomes for public housing tenants in relation to the tenure mix of their immediate neighbourhood, finding that as the proportion of public housing tenants in the local area increases, hospitalisation, mental health outpatient service use and prescriptions decrease, although this was mostly reversed in very high densities of public housing.

Our focus on wellbeing is particularly important since public housing tenants (by virtue of public housing eligibility criteria, outlined further below) often face greater disadvantage than do private sector tenants or homeowners.[4] Our research forms part of a larger programme that is designed to improve the wellbeing of public housing tenants and their communities.[5] We gather survey data from tenants with six different public housing providers (spread across three separate urban areas) and from private tenants and owner-occupiers in houses near public housing developments in the Wellington urban area.

Our empirical analysis focuses on Wellington to reduce confounding influences of variations between urban areas. Public housing in the Wellington sample includes three large apartment blocks, five smaller public housing apartments or townhouse developments, and stand-alone public housing dwellings within Wellington City. The two SWB measures that we utilise in this study are the WHO-5 mental wellbeing scale (an affect measure relating to the past two weeks) and an evaluative measure of life satisfaction. Other survey data include tenure status, demographic characteristics, residents' personal life experiences and beliefs (e.g. discrimination and spirituality), house characteristics and neighbourhood characteristics (including public transport). By focusing our analysis on the relationship of tenure status (including public housing) to personal, house and neighbourhood characteristics, we contribute insights that extend both the literature on SWB impacts of the built environment and the literature on the micro-geography of the community.

Section 2 of the paper provides background 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 Sect. 4 provides key descriptive statistics. Section 5 presents empirical results with respect to our research questions. Key findings include: (i) despite selection issues, public housing tenants have higher wellbeing than do private tenants; (ii) house and neighbourhood suitability are both strongly associated with residents' wellbeing, with relevant factors including dampness and cold indoor temperatures, plus neighbourhood characteristics (safety, social capital and public transport); (iii) as length of tenure increases, the divergence in wellbeing

[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.

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

between public and private renters diminishes. Section 6 provides concluding observations.

Background

New Zealand experiences high levels of household crowding and homelessness (Howden-Chapman et al., 2021). These trends are particularly evident in Māori and Pacific households[6] (Amore, et al., 2021; Lawson-Te Aho et al., 2019). The total public housing stock across all providers – including central government (through Kāinga Ora—Homes and Communities, hereafter Kāinga Ora[7]), local councils and non-governmental organisations – constitutes 3.8% of the country's total private dwelling stock (MHUD, 2023). This proportion compares with an average of around 6% in OECD and non-OECD European countries.[8] In March 2023, the 'Housing Register' (the public housing waiting list for those assessed as having 'serious' housing needs and who are eligible for public housing but have yet to be placed), equated to 1.1% of the total housing stock, or 31% of the public housing stock.

Many public housing tenants face multiple forms of deprivation reflecting selection into public housing. Each applicant for public housing is given a housing need priority rating based on an assessment of five criteria: (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 necessary to secure private housing (MSD, 2022).

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 unobserved omitted factors, which may include personal details such as family violence and social competence, are likely to be correlated negatively with measures of wellbeing.[9] 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

[6] Māori are the indigenous population of New Zealand; Pacific peoples 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 born in New Zealand.

[7] Kāinga Ora, established in 2019 as a Crown Agency, was formerly known as Housing New Zealand Corporation (HNZ). Kāinga Ora provides approximately 90% of all public housing in the country.

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

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

between wellbeing and housing tenure against finding a positive association between subjective wellbeing and public housing (relative to other forms of tenure).

Two prior (unpublished) studies deal with the relationship of public housing to SWB in New Zealand. Anastasiadis et al. (2018) attempt to control for unobservable effects in their study of the wellbeing effects of placement into public housing. They combine data on successful public housing applications with data on people surveyed by the official statistical agency, Stats NZ, in the New Zealand General Social Survey (NZGSS). The study identifies survey respondents who were interviewed in the 15 months prior to public housing placement (the 'Before' group) and respondents interviewed in the 12 months after placement (the 'After' group). After public housing placement, there was a significant reduction (relative to the Before group) in experiences of mouldy housing, crowded housing, and housing which is in poor condition. However, the After group 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 5-point scale) compared with 44% for the Before group. After controlling for compositional differences, life satisfaction for the After group had a point estimate that was 0.41 points higher than the Before group ($p < 0.05$). Thus, the evidence indicated that placement in public housing resulted in higher overall wellbeing coupled with better housing quality outcomes. Our study extends that of Anastasiadis et al. by (i) using a survey targeted especially at issues of importance for public housing tenants, (ii) using a wider range of SWB measures, (iii) extending the tenure comparison also to owner-occupiers, (iv) decomposing the impact of covariates on the relationship between SWB and tenure status, and (v) examining the impact of length of tenure on the relationship of SWB to tenure status.

Also using NZGSS data, Smith and Davies (2020) found for their full sample, and for a sample of Kāinga Ora tenants, that life satisfaction is negatively associated with poor house condition, mould and cold.[10] We extend that study by analysing whether public housing tenure affects the SWB of tenants both directly and through potential mediating effects of housing, neighbourhood or related factors.

In the UK, Fujiwara (2013) conducted a similar study to that of Smith and Davies (2020), using British Household Panel Survey (BHPS) data, distinguishing between respondents who lived in different tenure types. 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 a Housing Association (HA) dwelling is estimated to increase life satisfaction relative to being in a private rental, which Fujiwara conjectures may be due to lower rents 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

[10] The impact of dampness, which has been shown to have an independent effect (Riggs et al., 2021) was not assessed. The relationship of poor house condition to health and wellbeing is reviewed in Howden-Chapman, Bennett, et al. (2023).

amenities, estate design, and length of residence. Building on these studies, we examine relationships of wellbeing with tenure type, personal characteristics, house characteristics and neighbourhood characteristics.

Kāinga Ora tenants and tenants with some other public housing providers receive subsidised rents through the Income Related Rent Subsidy (IRRS) programme. Under this programme, a tenant's rent is capped at 25% of their net household income up to the level of the New Zealand Superannuation (pension) rate, and at 50% of income over that amount (Hyslop & 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 and who apply for AS. Eligibility for AS depends on several factors including: (low) income, housing costs, family size, housing tenure type and location. Approximately 11% of the population receives AS (Hyslop & 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 AS recipient. A subsequent study (Majid, 2023) found that AS receipt has no effect on rents. In our study, we do not have data on rents paid or rental subsidies received. However, analysis in Sect. 4 indicates that even after the impacts of rental subsidies, public renters in our sample have a higher proportion (than private renters) who state that their income is "not enough" or "only just enough" to meet their needs, so are more likely to be financially disadvantaged even after receiving a rent subsidy. We control for this influence in our analysis.

Survey and Data Collection

A survey comprising 74 questions (plus sub-questions) addressed to adult residents was administered at each site to gather evidence from residents.[11] 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 over-represented in public housing settings. Many of the questions are drawn from the NZGSS and from Stats NZ's related Māori social survey, Te Kupenga, ensuring that the question items have an extensive track record of use.

The survey's wellbeing questions include an 11-point evaluative subjective well-being (SWB) question relating to life satisfaction (OECD, 2011) worded as follows:

> *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?*
> **Answer categories**: (0) Completely dissatisfied, …, (10) Completely satisfied.

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

The survey also includes the WHO-5 mental wellbeing scale relating to feelings of cheerfulness, calmness, activity, rest and interest (Topp et al., 2015), reported as a value from 0 to 100.

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) and correspond closely to the seven pathways that Mouratidis (2021) outlines for the relationship between the built environment and SWB. Questions that relate to house quality cover: dwelling condition, cold, mould, dampness, excess heat, pride in the house and how well the house meets the tenant's needs. These questions relate to key findings in the literature regarding shortcomings of New Zealand housing (Howden-Chapman, Crane, et al., 2023a, 2023b). 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,[12] 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 Greater 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 self-reported housing tenure, and respondents were then classified as public housing tenants of Kāinga Ora, or private rental sector tenants or owner-occupiers. In these latter cases, it is likely that some residents occupied homes that were formerly owned by Kāinga Ora but which had been sold through the 1990s (Bergstrom et al., 2014). 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 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 (other than

[12] Reconstituted as a community housing provider, *Te Toi Mahana (the place of caring and nurturing, standing and belonging)*, from 1 August 2023.

Kāinga Ora[13]) to introduce the research team and survey without breaching privacy legislation (Dillman et al., 2009; O'Sullivan et al., 2013).[14]

Descriptive Statistics

Our full sample comprises 575 respondents (after removal of 17 responses deemed to be unreliable). The correlation coefficient between our two SWB dependent variables (*Life satisfaction* and *WHO-5*) is 0.55 indicating that, while positively correlated, the two measures capture distinct aspects of wellbeing. Of those who returned the survey, *Life satisfaction* had a response rate of 98.3% while *WHO-5* 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[15]) had response rates of 87–90%; the question relating to number of years in the current tenancy had a response rate of 77%. In each of our regressions, we include missing observations for an explanatory 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 survey includes two variables (used as explanatory variables) relating to overall material wellbeing: (i) equivalised household income[16]; and (ii) the degree to which household income meets needs ("*Income meets needs*"). The latter is worded as follows:

> *How well does your total household income meet your everyday needs, for such things as accommodation, food, clothing, and other necessities?* **Answer categories**: ( ) not enough money; ( ) only just enough money; ( ) enough money; ( ) more than enough money.

Brief descriptive statistics for these variables are shown in Table 1 (with more comprehensive statistics for the Wellington sample plus full definitions provided in Appendix Table 4). 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. The Wellington public housing summary statistics are very similar to those for the full

[13] Kāinga Ora tenants and other respondents in Eastern Porirua were approached directly via the postal survey.

[14] Additional details of the survey methodology and response rates are included in Grimes et al. (2023), Appendix 1.

[15] By contrast, the response rate to a question on whether "income meets needs" is 98%.

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

Table 1 Subjective wellbeing and material wellbeing descriptive statistics

Variable	Public rental (NZ)	Public rental (Wgtn)	Private rental (Wgtn)	Owner-occupier (Wgtn)
Life satisfaction (mean)	6.98	6.99	6.58	7.37
WHO-5 (mean)	79.7	81.4	68.1	79.5
Equivalised HH income (mean)	$21,788	$22,214	$35,755	$50,133
Income meets needs (cdf)				
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

Full definitions are provided in the text and in Appendix Table 4. Wgtn = Wellington urban area. Equivalised HH Income is total household income divided by square root of household (HH) size. N = maximum number of observations for each tenancy category; cumulative percentages shown for *Income meets needs*; means shown for all other variables. 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

sample of public housing tenants, so discussion henceforth focuses on the Wellington sub-sample.

Despite the selection factors with respect to public housing placement, the two subjective wellbeing measures indicate higher wellbeing, on average, of public renters relative to private renters. On average, owner-occupiers have higher *Life satisfaction* than do public renters (with approximately equal *WHO-5* scores) and have higher subjective wellbeing on both measures relative to private renters. The higher subjective wellbeing scores for public relative to private renters is despite much higher average incomes of private renters reflecting the role of income in the selection criteria for placement into public housing. Even with the sizeable income disparity, public and private renters have similar proportions of respondents who state that their income is not enough to meet their needs, indicating a positive impact of public housing provision (including rental subsidies for those who are eligible) on the material wellbeing of the poorest tenants. Reflecting the selection into public housing, however, a lower proportion of public housing tenants report having 'enough' or 'more than enough' income to meet their needs than is the case for private renters or owner-occupiers.[17]

The large number of potential explanatory variables, many of which measure related concepts with high correlations, precludes inclusion of all survey questions as control variables. To address this challenge, we combine variables into groups that are conceptually related and which map well to the pathways from the built environment

[17] Grimes et al. (2023), Appendix 3, further analyses the relationship of income-related rents and other rental subsidies to equivalised household income and *Income meets needs*.

to SWB outlined by Mouratidis. We take 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: (1) having a cold house, (2) having a damp house, (3) house suitability, (4) dwelling condition, (5) heating type, (6) material wellbeing, (7) neighbourhood and social capital, (8) Māori culture, (9) discrimination, (10) spirituality, and (11) public transport.[18]

In addition to the principal components, personal characteristics included in our analysis comprise: ethnicities (4 dummy variables), gender (2), presence of children of different ages (2), household size, self-rated health (5-point scale), and a quadratic for number of years in the current tenancy.[19] Table 5 in the Appendix. provides summary statistics for the demographic variables for public renters, private renters and owner-occupiers in the Wellington sample. The table also includes four indicators of house and area quality (each of which is included in the principal components).[20] These indicators show that private rentals are, on average, colder and suffer more from damp than do either public rentals or owner-occupied housing; private renters also find that their house is less suitable for their needs relative to public renters and (especially) relative to owner-occupiers. By contrast, private renters find that the area in which they live suits their needs better than do either owner-occupiers or public renters.

Results

Our central research question 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 the following regressions with alternative sets of control variables used to indicate stability of estimated coefficients for the focal variables (Altonji et al., 2005):

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \varepsilon_i \tag{1}$$

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \beta_2 D_i + \beta_3 P_i + \varepsilon_i \tag{2}$$

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \beta_2 D_i + \beta_3 P_i + \beta_4 H_i + \beta_5 N_i + \varepsilon_i \tag{3}$$

[18] The formulation of the principal components is outlined in more detail in Grimes et al. (2023), Appendix 4.That study also examined replacing the principal component representing house suitability with specific survey questions on a respondent's pride in their home and on the respondent's view of the suitability of their home, and replacing the neighbourhood principal component with a survey question referring to the respondent's view of the suitability of their neighbourhood. Results using these variables are similar to those reported here using the principal components.

[19] Survey questions also covered: Age, Long-term illness, Disability, and Labour force status; none of these variables was significant when tested in our analysis, so are henceforth omitted.

[20] In separate work, we find that people are more satisfied with their home and neighbourhood when they live in a house that is warm and dry, and in a safe neighbourhood in which there is strong social capital; good public transport is also relevant to people's comfort in inviting others to their home (Grimes et al., 2023).

where:

W_i^m is one of the two subjective wellbeing metrics (m) for respondent i;

$Tenancy_i$ is a vector of tenure status (public rental, private rental, owner-occupier);

D_i is a vector of demographic variables[21];

P_i is a vector of other personal variables[22];

H_i is a vector of house variables[23];

N_i is a vector of neighbourhood variables.[24]

Equation (1) simply relates each wellbeing metric to tenancy type with no added control variables. We estimate this equation for each wellbeing metric (*WHO-5* and *Life satisfaction*) by ordinary least squares (OLS). Estimates using ordered logit, which recognises the ordinal nature of the dependent variables, provide very similar results (see Grimes et al., 2013). Bond and Lang (2019) argue that even ordered logit estimates may not be appropriate for interpreting results as relating to some underlying concept of wellbeing if certain (extreme) functional form assumptions for ordinal dependent variables 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. Accordingly, we estimate Eq. (1) also for a binary representation of each wellbeing metric using OLS, i.e. a linear probability model (logit and probit estimates again provide very similar results). Equation (2) adds demographic and other personal controls, while Eq. (3) further adds house and neighbourhood controls.

Estimates of Eq. (1) are presented in Table 2 both for the (cardinal) wellbeing variables and for the transformed binary representations of those variables (*WHO5_median* and *LS_median* respectively). The results using both estimation approaches indicate that the mental wellbeing (*WHO-5*) of public tenants is higher than that of private tenants (significant at $p<0.05$ and $p<0.1$ respectively). Point estimates also indicate higher *Life satisfaction* for public relative to private tenants (significant at $p<0.05$ for the binary representation). The wellbeing of public tenants is not significantly different to that of owner-occupiers for three of the four estimates, though is estimated to be lower than that of owner-occupiers for the binary *Life satisfaction* regression ($p<0.1$).

While the results in Table 2 provide support for the hypothesis that public housing has a beneficial effect on wellbeing (relative to private rentals), they do not include other control variables. We include control variables in Table 3 which presents OLS estimates for *WHO-5* and *Life satisfaction* based on Eqs. (2) and (3).[25] The significant positive association between wellbeing and public versus private

[21] The demographic variables comprise: Ethnicity, gender, presence of children of different ages, household size, self-rated health, and a quadratic for number of years in current tenancy.

[22] The personal variables include the principal components relating to: Material wellbeing, Māori culture, discrimination, and spirituality.

[23] The house variables include the principal components relating to: Having a cold house, having a damp house, house suitability, dwelling condition, and heating type.

[24] The neighbourhood variables include the principal components relating to: Neighbourhood and social capital, and public transport.

[25] Given the similarity in results when using the cardinal and binary representations of each variable, and when using ordered logit, we present only the OLS estimates using cardinal representations of the SWB variables in Table 3.

Table 2 Wellbeing metrics regressed on tenancy status (Wellington, no controls; OLS)

VARIABLES	(1) WHO-5	(2) Life satisfaction	(3) WHO5_median	(4) LS_median
Tenancy status (Base: Public rental)				
Private rental	-13.322**	-0.413	-0.169*	-0.177**
	(5.328)	(0.323)	(0.090)	(0.081)
Owner-occupier	-1.902	0.384	-0.052	0.102*
	(3.250)	(0.247)	(0.060)	(0.060)
Observations	386	400	404	404
R^2	0.016	0.010	0.009	0.020
Controls	NO	NO	NO	NO

Robust standard errors in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$. WHO5_median is a binary variable = 1 if WHO-5 > 80 (54% of observations) and = 0 otherwise. LS_median is a binary variable = 1 if Life-satisfaction > 7 (43% of observations) and = 0 otherwise

rentals is strengthened with the addition of the control variables. Furthermore, the effect sizes are large, representing approximately 44% of the sample standard deviation of *WHO-5* and approximately 26% of the sample standard deviation of *Life satisfaction*. After accounting for the full range of controls, the WHO-5 measure for people in public rentals is also estimated to be higher than that for owner-occupiers (significant at $p<0.05$), with no significant difference in life satisfaction. The higher levels of positive affect for public renters relative to owner-occupiers may reflect financial anxieties faced by mortgage holders (Will & Renz, 2023), that are absent for public renters.

The house and neighbourhood controls proxy several of the pathways advanced by Mouratidis, especially: travel, leisure, social relationships, residential wellbeing, emotional responses and health (work, proxied by labour force status, is not significant in our regressions). The most striking estimates relate to the negative effects of dampness and cold indoor temperatures on *Life satisfaction*, and the positive effects of neighbourhood quality on *Life satisfaction*. The importance of house quality (dampness and cold) for residents' SWB is consistent with the prior findings of Anastasiadis et al. (2018) and Smith and Davies (2020). In addition, the quality of public transport has a positive association with shorter term affect (*WHO-5*). Importantly for our analysis, even after controlling for these influences, we find that *Life satisfaction* and *WHO-5* are materially higher for public renters than for private renters.

While the results in Tables 2 and 3 consistently indicate higher wellbeing for public relative to private renters, Table A5 indicates that the added control variables in Table 3 are correlated with the tenure variables. These correlations may reflect mediating effects whereby different forms of tenure either affect, or affected by, the added control variables. To test the impact of the added controls on the estimates for the tenure variables, we use the decomposition approach of Gelbach (2016). For this procedure, we use the estimates in columns (1) and (2) of Table 2 as the "base" equation (i.e. without controls) and use the estimates in columns (1) and (3) of Table 3 as the "full" equation to estimate how the added demographic and personal controls act

Table 3 Wellbeing metrics regressed on tenancy status (Wellington, with controls; OLS)

VARIABLES	(1) WHO-5	(2) WHO-5	(3) Life satisfaction	(4) Life satisfaction
Tenancy status (Base: Public rental)				
Private rental	-12.896***	-12.707***	-0.575**	-0.581**
	(4.875)	(4.855)	(0.288)	(0.292)
Owner occupier	-7.546**	-8.640**	-0.262	-0.375
	(3.353)	(3.404)	(0.281)	(0.283)
House and neighbourhood controls				
Cold house		-0.414		-0.115*
		(0.879)		(0.060)
Damp house		-1.905		-0.265***
		(1.184)		(0.068)
House suitability		1.704		0.057
		(1.567)		(0.086)
House condition		-0.615*		0.026
		(0.369)		(0.048)
Heating type		1.578		0.024
		(1.071)		(0.083)
Neighbourhood quality		0.377		0.123**
		(0.806)		(0.050)
Public transport quality		1.257***		0.056
		(0.530)		(0.044)
Observations	384	384	398	397
R-squared	0.354	0.377	0.241	0.287
Demographic & personal controls	YES	YES	YES	YES
House & neighbourhood controls	NO	YES	NO	YES

Robust standard errors in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$. Demographic and personal controls include: Ethnicity (European, Māori, Pacific, Asian, Other), Gender (Male, Female, Alternative), (Household composition (Children under 5 present, Children 5–17 years present, Household size), Health (5-point scale), Years in current tenancy (quadratic), and principal components for: Material wellbeing, Māori cultural attachment, Discrimination, and Spirituality. Listed house and neighbourhood controls are each principal components formed from multiple indicator variables

as mediators for the relationship between SWB and tenure. The Gelbach decomposition provides a conditional decomposition (with consistent standard errors) of the degree to which each of the added covariates affects the estimate of the tenure coefficients in the full, relative to the base, equation. We then repeat the same approach using columns (1) and (3) of Table 3 as the base equation and columns (2) and (4) of that table as the full equation to examine the mediating effects of the house and neighbourhood control variables. The results of the two decomposition analyses are reported in Tables 6 and 7 in the Appendix. The most notable mediating influence is seen with the addition of the *Health* variable for the estimated effect of owner-occupation (relative to public housing) for both *WHO-5* and *Life satisfaction*. In addition, length of tenancy affects the *Life satisfaction* estimate for owner-occupiers.

While controlling for demographic, personal, house and neighbourhood characteristics, the results presented above do not differentiate relationships between tenancy type and wellbeing according to tenant characteristics. We extend Eq. (3) to include interactions between tenancy type and demographic characteristics, concentrating on the characteristics included as "Demographic controls" in the prior specifications. (We have also tested for interactions of tenancy type with the two material wellbeing variables and with a measure of household crowding, defined as the ratio of the number of people in the household to the number of bedrooms,[26] but none of these interactions is significant.)

The resulting specification is shown as Eq. (4):

$$W_i^m = \beta_0 + \beta_1 Tenancy_i + \beta_2 Tenancy_i * Characteristic_i + \beta_3 D_i + \beta_4 P_i + \beta_5 H_i + \beta_6 N_i + \varepsilon_i \tag{4}$$

where $Characteristic_i$ is one of the variables that appears in the D_i vector. To keep the analysis manageable, each characteristic is interacted in separate regressions. We use a Wald test for each tenure type to test for significance of variables that have multiple categories.

The only significant interaction effect is that for years of occupancy in the current house. Figures 1 and 2 plot the difference in *WHO-5* and *Life satisfaction* respectively for a private renter versus a public renter against the number of years of occupancy in the current house.[27] Both figures indicate that (after controlling for other covariates) private renters with tenancies of five years or less have significantly lower SWB than do public renters with the same length of tenancy. SWB of private renters almost reaches that of public renters after 20 years of occupancy, and the differences are no longer significant after ten years of occupancy. The closing of the gap is primarily due to higher SWB of private renters as length of tenure increases. This emphasis on differences in security of tenure between public and private renters helps to explain differences between public and private tenant SWB found previously by Anastasiadis et al. (2018).

The non-significance of the interaction terms (other than for occupancy length) indicates that the likely source of advantage of residing 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 uncertain tenancy in private rentals, reflecting New Zealand's tenancy laws which historically have enabled landlords to evict tenants in many situations at short notice.[28] By contrast, public tenancies enable long-term occupancy (including, at the time of the survey, a programme giving additional support for sustaining tenancies in the face of hardship), with resulting advantages in terms of building social capital and reducing stress related to uncertain tenancies.

[26] 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.

[27] 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.

[28] The 2021 Residential Tenancies Act Amendment introduced during the Covid pandemic placed restrictions on landlords' abilities to give short notice although these provisions now face repeal.

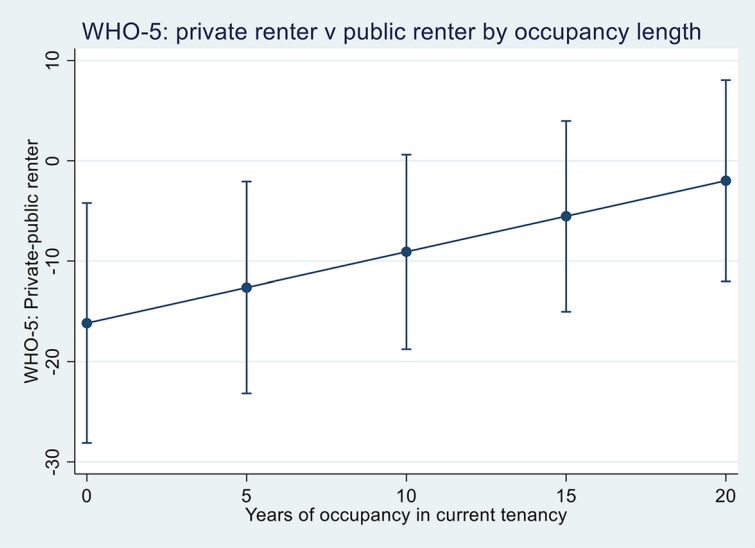

Fig. 1 Contrast plot for *WHO-5*, private renters v public renters by occupancy length**.** The figure contrasts the estimate for *WHO-5* for a private renter versus a public renter according to number of years of occupancy in the current house, based on Eq. (4) with 95% confidence intervals shown (holding other variables at their means). Private renters with short tenancies have significantly lower *WHO-5* scores than public renters, with scores almost catching up after 20 years of occupancy (and with no significant difference after 10 years)

Conclusions

The relationship of the built environment (i.e. micro-geography) to people's subjective wellbeing depends not just on the characteristics of their house and neighbourhood – though these characteristics are undoubtedly important – but also on their form of tenure. 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 tenure and the other has insecure tenancy, their appreciation of those characteristics, and their overall wellbeing, may differ markedly. Thus, analyses of the relationships of SWB to the built environment should consider the forms and the security of residents' tenure in addition to local characteristics.

We utilise a survey administered to Wellington residents who are either in public rental housing or in geographically proximate private rental or owner-occupied housing. The survey data enable us to focus on the association between residents' subjective wellbeing and their tenure type, house characteristics and neighbourhood characteristics. Our 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).

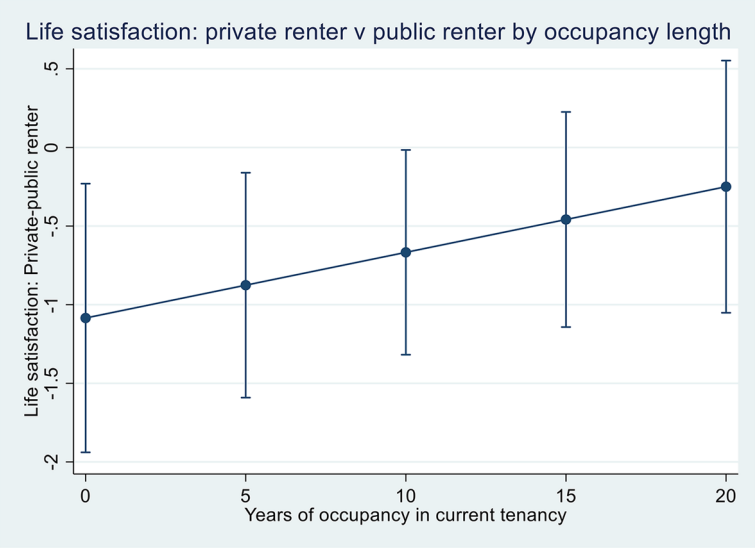

Fig. 2 Contrast plot for *Life satisfaction*, private renters v public renters by occupancy length**.** The figure contrasts the estimate for *Life satisfaction* for a private renter versus a public renter according to number of years of occupancy in the current house, based on Eq. (4) with 95% confidence intervals shown (holding other variables at their means). Private renters with short tenancies have significantly lower *Life satisfaction* scores than public renters, with scores almost catching up after 20 years of occupancy (and with no significant difference after 10 years)

We find a strong association between SWB and tenure type, with residents in public housing having higher wellbeing than 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. 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 the role of tenure type, we find that *Life satisfaction* is affected by house condition (dampness and cold) and by perceptions of neighbourhood suitability (in turn, reflecting the importance of social capital and of living in a safe area). Shorter-term affect (*WHO-5*) is associated positively with the residents' perception of the quality and availability of public transport.

At a policy level, our results are important in establishing that the public housing programmes covered by our sample of houses – which include provision by central government, local government and Community Housing Providers – are

very likely to be 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.

Four policy implications flow from these findings, relating to public rentals, private rentals and the neighbourhood. First, while we find that New Zealand's public housing programmes are successful in improving the lives of people facing multiple disadvantages, we note the long waiting list for people to access public housing. In March 2023, the waiting list for people having serious housing needs who were eligible for public housing stood at 31% of the public housing stock. An increase in the stock of public housing is therefore required to accommodate these families who are in serious housing need.

Second, the findings from our sample, which are consistent with findings from prior work in New Zealand (Anastasiadis et al., 2018; Smith & Davies, 2020), show that the quality of public housing, especially in relation to dampness and cold internal temperatures, is (on average) higher than the quality of private rentals. Considerable evidence exists in the New Zealand context to show that warm, dry housing is essential for good health (Howden-Chapman, Crane et al., 2023a, 2023b; Preval et al., 2017). While there have been some legislative requirements to improve the quality of the private rental housing stock in recent years, the average quality of the private stock is still well below that of public housing dwellings. There is a need to lift the quality of private rentals to a level at least commensurate with that of public housing to improve the wellbeing and the health of private sector renters.

Third, the importance of security of tenure for tenant wellbeing is a key finding. Security of tenure has traditionally been high for public housing renters, though a weakening is mooted by the current New Zealand government for those who are 'anti-social'. Recognising the trade-offs involved for this group of tenants, our results suggest that the wellbeing of family members of such tenants will be harmed if security of tenure for that group is weakened. Other avenues to address the behaviour of anti-social tenants should take priority over any weakening of security of tenure. For private sector tenants, security of tenure was strengthened through the Covid pandemic crisis but a new government has announced an intention to weaken private renters' tenure security. Given the vital role of secure tenancies for the wellbeing of tenants, legislative actions need to strengthen, rather than weaken, private sector tenants' security.

Fourth, neighbourhood safety and community social capital are shown to be important for people in all forms of tenure. Both central and local government, plus non-governmental organisations, have roles to play in boosting local safety and social capital. Improving these aspects at the local level are therefore likely to boost wellbeing still further.

Appendix

Table 4 Subjective wellbeing and material wellbeing descriptive statistics (Wellington sample)

Variable	Public rental	Private rental	Owner-occupier
Life satisfaction (mean)	6.99	6.58	7.37
(std dev)	2.28	1.70	1.96
(min)	0	3	0
(max)	10	10	10
WHO-5 (mean)	81.4	68.1	79.5
(std dev)	30.2	28.6	25.1
(min)	0	5	15
(max)	125	125	125
Equivalised HH income (mean)	$22,214	$35,755	$50,133
(std dev)	$16,071	$16,412	$31,166
(min)	$3,780	$5,000	$3,780
(max)	$125,000	$62,500	$159,099
Income meets needs (cdf)			
not enough	28%	27%	16%
+ only just enough	72%	64%	46%
+ enough	97%	91%	95%
+ more than enough	100%	100%	100%
Observations (N)	279	33	92

HH = household; Wgtn = Wellington urban area; N = maximum number of observations for each tenancy category; cumulative percentages shown for *Income meets needs*; means, standard deviations, and minimum and maximum values are shown for all other variables. All statistics exclude: 5 houses for which tenancy status is unknown, 16 'quality flag' (dubious data) respondents, and missing data for that variable. The summary statistics refer only to respondents who lived within the Wellington urban area

Table 5 Summary statistics (means) for demographic variables and selected house and area indicators (Wellington sample)

Variable	Public rental	Private rental	Owner-occupier
Ethnicity			
NZ European	0.43	0.64	0.52
Māori	0.28	0.24	0.20
Pacific	0.23	0.39	0.28
Asian	0.03	0.00	0.02
Other	0.14	0.15	0.17
Gender			
Female	0.55	0.73	0.72
Male	0.44	0.27	0.26
Alternative gender	0.01	0.00	0.02
Household structure			
< 5 year-olds present	0.05	0.15	0.13
5–17 year-olds present	0.26	0.30	0.36
Household size	2.13	3.18	3.48
Self-assessed overall health			
Poor	0.10	0.06	0.02
Fair	0.26	0.33	0.21
Good	0.36	0.33	0.36
Very good	0.22	0.18	0.29
Excellent	0.07	0.09	0.12
Occupancy length			
Number of years in current house	10.3	10.1	21.1
House and neighbourhood indicators			
Cold	1.38	1.85	1.30
Damp	0.50	0.79	0.55
House suits	2.71	2.55	2.92
Area suits	2.69	2.88	2.69

Means of categorical variables represent proportions of sample; "missing observations" equal the omitted proportions of that group; the sum of ethnicities > 1 as people can report multiple ethnicities. 'Cold' (in the house) is measured on a 0–3 scale where 0 is least cold. 'Damp' (in the house) is measured on a 0–2 scale where 0 is least damp. 'Home suits' is measured on a 0–4 scale where 4 is most suitable. 'Area suits' is measured on a 0–4 scale where 4 is most suitable

Table 6 Gelbach decomposition of difference between estimates with and without demographic and personal controls, explained by those controls

	(1)	(2)	(3)	(4)
	WHO-5	WHO-5	Life satisfaction	Life satisfaction
VARIABLES	Private vs public renter	Owner vs public renter	Private vs public renter	Owner vs public renter
Material wellbeing	0.382	0.256	-0.945	-0.034
	(0.773)	(0.531)	(0.052)	(0.041)
Māori culture	-0.040	-0.019	0.003	-0.001
	(0.195)	(0.098)	(0.024)	(0.005)
Discrimination	-0.074	0.053	0.042	-0.015
	(0.190)	(0.171)	(0.037)	(0.032)
Spirituality	0.000	-0.000	0.000	-0.000
	(0.068)	(0.053)	(0.007)	(0.005)
Ethnicity	1.057	-0.060	0.128	0.039
	(1.225)	(0.699)	(0.093)	(0.053)
Gender	-1.030	-1.035*	-0.015	-0.007
	(0.688)	(0.582)	(0.038)	(0.038)
Household composition	-0.661	-0.848	0.051	0.059
	(0.937)	(1.008)	(0.073)	(0.084)
Health	0.125	6.317***	0.010	0.327***
	(3.073)	(2.041)	(0.173)	(0.119)
Years of occupancy	-0.172	1.276	-0.006	0.279**
	(0.582)	(1.395)	(0.055)	(0.133)
Total	-0.413	5.939**	0.169	0.647***
	(3.538)	(2.750)	(0.213)	(0.189)

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Column (1) decomposes difference between estimates of Private rental relative to public rental in Table 3 column (1) vs Table 2 column (1). Column (2) decomposes difference between estimates of Owner-occupier relative to public rental in Table 3 column (1) vs Table 2 column (1). Column (3) decomposes difference between estimates of Private rental relative to public rental in Table 3 column (3) vs Table 2 column (2). Column (4) decomposes difference between estimates of Owner-occupier relative to public rental in Table 3 column (3) vs Table 2 column (2). All decompositions use the approach of Gelbach (2016)

Table 7 Gelbach decomposition of difference between estimates with and without house and neighbourhood controls, explained by those controls

	(1)	(2)	(3)	(4)
	WHO-5	WHO-5	Life satisfaction	Life satisfaction
VARIABLES	Private vs public renter	Owner vs public renter	Private vs public renter	Owner vs public renter
Cold house	0.079	0.026	0.026	0.020
	(0.187)	(0.103)	(0.019)	(0.025)
Damp house	0.002	0.424	0.012	0.106*
	(0.235)	(0.454)	(0.035)	(0.059)
House suitability	0.152	0.026	0.011	0.009
	(0.272)	(0.234)	(0.021)	(0.020)
House condition	0.255	0.311	-0.011	-0.013
	(0.212)	(0.291)	(0.020)	(0.025)
Heating type	-0.226	0.112	-0.006	0.001
	(0.386)	(0.296)	(0.023)	(0.005)
Neighbourhood	-0.043	-0.102	-0.016	-0.044
	(0.118)	(0.239)	(0.025)	(0.039)
Public transport	-0.408	0.298	-0.021	0.025
	(0.285)	0.445)	(0.020)	(0.026)
Total	-0.189	1.095	-0.009	0.104
	(0.653)	(0.872)	(0.062)	(0.089)

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Column (1) decomposes difference between estimates of Private rental relative to public rental in Table 3 column (2) vs Table 3 column (1). Column (2) decomposes difference between estimates of Owner-occupier relative to public rental in Table 3 column (2) vs Table 3 column (1). Column (3) decomposes difference between estimates of Private rental relative to public rental in Table 3 column (4) vs Table 3 column (3). Column (4) decomposes difference between estimates of Owner-occupier relative to public rental in Table 3 column (4) vs Table 3 column (3). All decompositions use the approach of Gelbach (2016)

Definitions

Life satisfaction is the response to the question:

> *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?* **Answer categories**: (0) Completely dissatisfied, …, (10) Completely satisfied.

WHO-5 is a mental wellbeing scale based on five questions relating respectively to feelings of: cheerfulness, calmness, activity, rest and interest. Each question is answered with respect to feelings over the past two weeks, on a 6-point scale (0 to 5, where 0 is having the feeling "at no time" and 5 is having the feeling "all of the time"). The scores from the five questions are aggregated, resulting in a 26-point scale (Topp et al., 2015). We then multiply each value by 5 to give a value from 0–125.

Equivalised household (HH) income is the sum of all sources of income for the household divided by the square root of household size.

Income meets needs is the response to the question:

> *How well does your total household income meet your everyday needs, for such things as accommodation, food, clothing, and other necessities?* **Answer categories**: ( ) not enough money; ( ) only just enough money; ( ) enough money; ( ) more than enough money.

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Data Availability Data are obtained via a confidential survey. Any researcher wishing to gain access to the data for research purposes should contact the lead author to discuss their data needs.

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