



Growing Up in New Zealand

Now We Are Twelve

Life in early adolescence

Supplementary materials for Housing and homelessness

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S1. Definition of household tenure

Household tenure in this paper is derived from four questions on housing tenure:

1. Do you or anyone else who lives there, own, or partly own the house/flat you live in (with or without a mortgage)?
2. Do you or anyone else who lives with you, pay rent to an owner or to an agent for this house/flat you live in?
3. Do you, or anyone else who lives with you, make mortgage payments for the house/flat you live in?
4. Who owns the house/flat you live in?

The derived household tenure variable refers to the house/flat they lived in. It contains four categories: **home owned**, **private rental**, **public housing**, and **other situations**. Their definitions are listed below:

Home owned: The household member(s) own or partly own or pay mortgage for the house/flat, or it is owned by the family (non-household member) with no mortgage.

Private rental: The house/flat is owned by private person, trust, or business, or family trust.

Public housing: The house/flat is owned by public-owned housing provided by Kainga Ora, non-profit community housing provider, local authority / City Council, or is other state-owned.

Other situations: (i) The household member(s) pay rent to an owner or to an agent for the house/flat, which is owned by other family member with/without mortgage or by other (not mentioned above); or (ii) the household member(s) do not own or do not partly own the house/flat but do not pay rent for it to an owner or to an agent.

S2. Descriptions about the condition of house/flat Cohort and sub-study participants

Five options about the condition of the house/flat (from excellent to very poor) were given in the mother questionnaire. The descriptions of these five options are:

Excellent – no immediate repair and maintenance needed

Good – minor maintenance needed

Average – some repair and maintenance needed

Poor – immediate repairs and maintenance needed

Very poor – extensive and immediate repair and maintenance needed

S3. Sensitivity analysis: ethnic disparities on housing quality and public housing tenure

Before excluding young people who lived in public housing, the confidence interval (CI) for Māori, Pacific and sole European groups were:

- Dampness/mould were a problem: Māori (38% [35-40%]) and Pacific (43% [40-47%]) groups were higher than sole European group (24% [22-25%]).
- Heating/keeping warm in winter: Māori (32% [29-35%]) and Pacific (38% [35-42%]) groups were higher than sole European group (19% [18-21%]).
- Keeping home cool in summer: Māori (38% [35-41%]) and Pacific (38% [34-42%]) groups were higher than sole European group (26% [24-27%]).

After excluding those who lived in public housing, the lower confidence interval (CI) for Māori and Pacific groups were attenuated but still above the upper 95% CL for sole European:

- Dampness/mould were a problem: Māori (36% [32-39%]) and Pacific (40% [36-44%]) groups were higher than sole European group (24% [22-25%]).
- Heating/keeping warm in winter: Māori (30% [27-33%]) and Pacific (34% [30-39%]) groups were higher than sole European group (19% [18-21%]).
- Keeping home cool in summer: Māori (37% [34-40%]) and Pacific (36% [32-40%]) groups were higher than sole European group (26% [24-28%]).

S4. Other measures of housing quality

a. Heating or keeping home warm in winter

Over three quarters (76%, $n = 3,286$) of young people lived in homes where their primary caregiver reported no problem with heating or keeping the home warm in winter, 20% ($n = 848$) lived in homes where this was a minor problem, and 5% ($n = 202$) lived in homes where this was a major problem. Again, the ability to keep the house warm varied by household tenure ($p < .001$). Those families who lived in public housing were far more likely to have a problem with heating or keeping the house warm compared to those in a family-owned home, and any other tenure type. Young people who lived in private rentals were also more likely to have a problem heating the home, although to a lesser extent. Patterns similar to dampness or mould problem emerged by ethnicity, neighbourhood deprivation, and household material hardship (Figure S1).

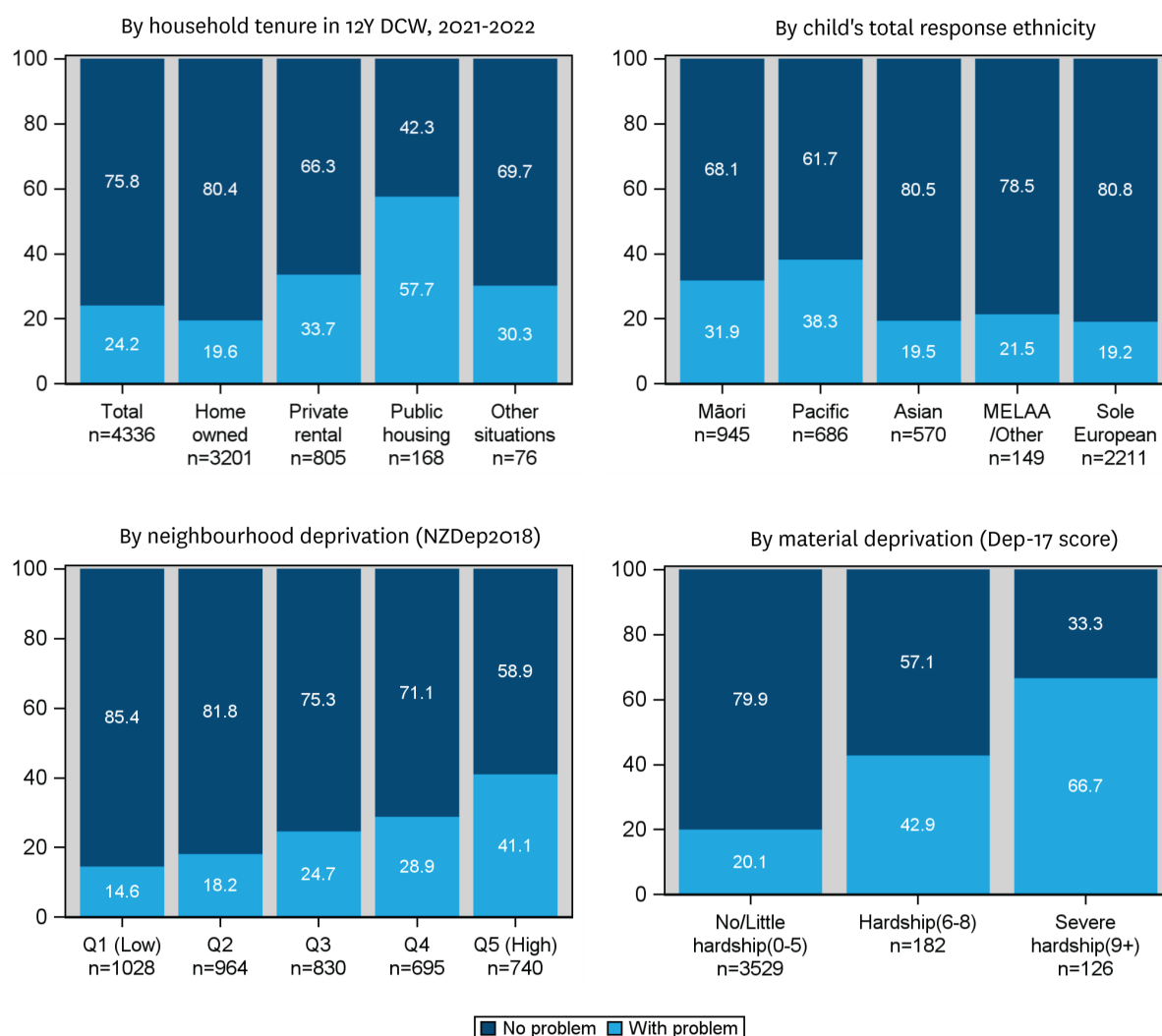


Figure S1. Proportion (%) of young people whose homes had problems with heating or keeping home warm in 12-year DCW - by household tenure, neighbourhood and household material deprivation

b. Keeping home cool in summer

A slightly greater proportion of the cohort had problems with keeping the home cool in summer (29%) compared to those who had problems with heating or keeping the home warm in winter (24%). Similar patterns in the ability to keep the house cool were seen by tenure type, ethnicity and neighbourhood deprivation (Figure S2). However, these differences were less pronounced compared to heating or keeping the home warm in winter (Figure S1). For example, 80% of young people in family-owned homes reported no problem with heating or keeping the house warm in winter, compared to 42% of those who lived in public housing – a 38% difference. This gap closed to 21% for keeping the home cool in summer – 74% of young people in family-owned homes said that keeping the home cool was not a problem compared to 52% of those in public housing. The ethnic disparities for keeping the home cool in summer were similar to those for keeping the home warm in winter.

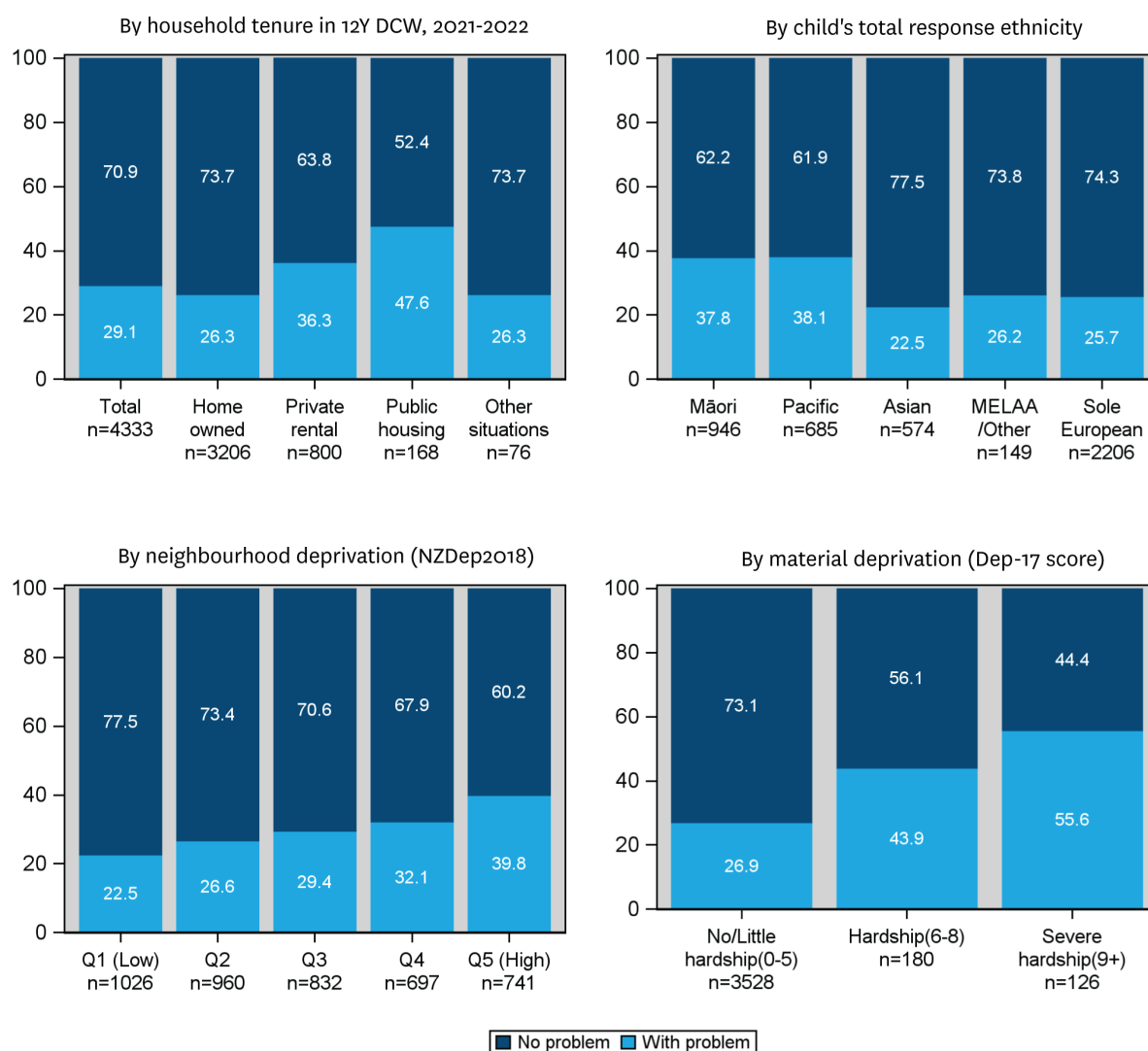


Figure S2. Proportion (%) of young people whose homes had problems with keeping home cool in 12-year DCW - by household tenure, neighbourhood and household material deprivation

c. Ceiling and underfloor insulation

Ceiling and underfloor insulation became compulsory for all private rentals and public housing on 1 July 2019, two years before the 12-year DCW (September 2021 – July 2022). Among young people whose mothers were aware of the insulation in their home,¹ 71% ($n = 2,656$) lived in homes with both ceiling and underfloor insulation, 26% ($n = 950$) in homes with either ceiling or underfloor insulation, and 3% ($n = 126$) in homes with neither ceiling nor underfloor insulation. Young people in households experiencing material hardship were less likely ($p < .001$) to live in homes compliant with the insulation standard. There were no statistical differences in insulation compliance by household tenure, neighbourhood deprivation, nor by ethnicity (Figure S3).²

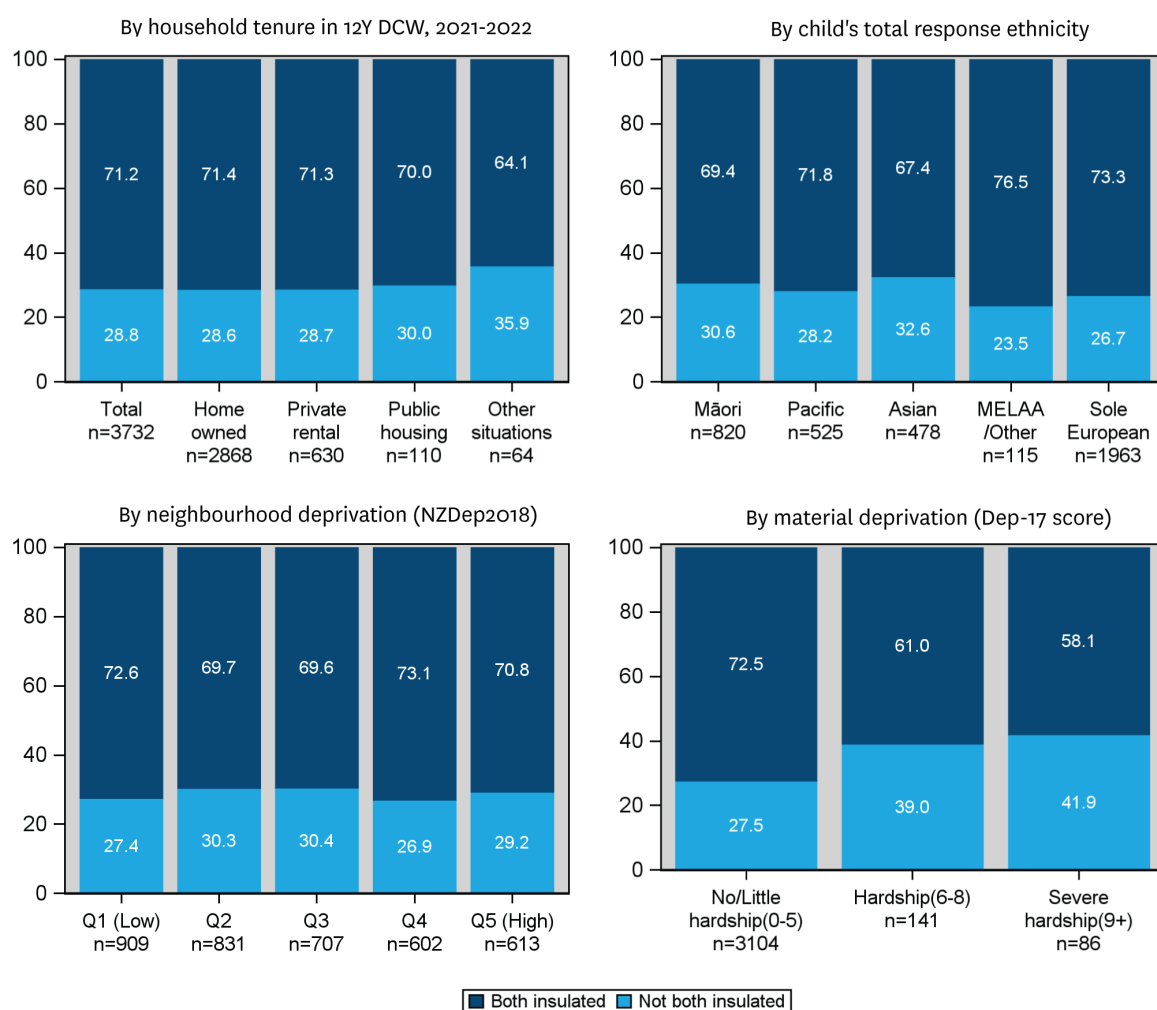


Figure S3. Proportion (%) of young people whose homes had ceiling and underfloor insulation in 12-year DCW - by household tenure, neighbourhood and household material deprivation

¹ We selected children whose caregivers were aware of having these insulation or not (i.e., excluded those who expressed 'Don't know' or missing response(s) to any of the two insulation question)

² The 95% CI for sole European [71-75%] overlapped with the 95% CI for Māori [66-72%], Pacific [68-76%], Asian [63-72%] and the MELAA [63-86%] groups.

In the 54-month DCW (October 2013 – March 2015), before insulation became mandatory, only 49% children were having both ceiling and underfloor insulation at home (Figure S4). This was about 23% lower than what we found in the 12-year DCW (Figure S3). Children who lived in a private rental or public housing in 54-month DCW were less likely to have both ceiling and underfloor insulation than those who lived in a family-owned home ($p < .001$). Conversely, there was no difference in insulation between household tenures in the 12-year DCW.

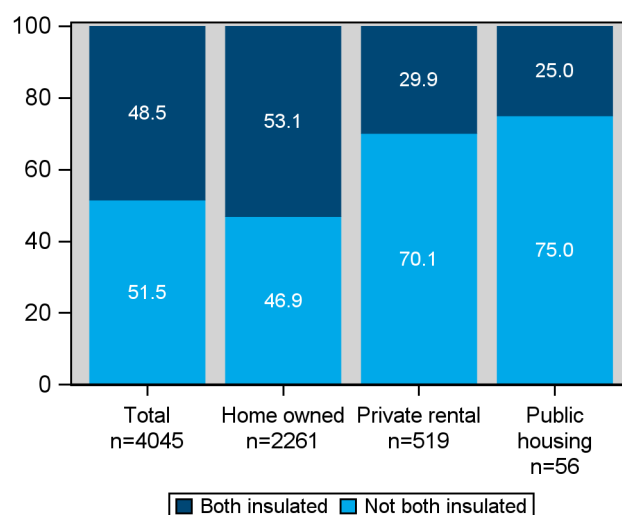


Figure S4. Proportion (%) of young people whose homes had ceiling and underfloor insulation in 54-month DCW – by household tenure

S5. Changes in damp or cold housing problems

Using the same questions in the 8-year and 12-year mother questionnaires about minor/major problem in (i) dampness/mould and (ii) heating/keeping home warm in winter, we first grouped the three categories (no problem, minor problem, major problem) in the original questions to two categories (no problem, problem). In each DCW we then combined the two questions on damp and/or cold problem into one so that the derived variable options became "no damp and cold problem" and "having damp or cold problem". Lastly, we combined the derived variables in 8-year and 12-year DCWs together into one single variable that indicates the changes in damp and cold problem so that the categories contain "still no problem", "improved to no problem" and "became/still a problem". These three categories are explained below:

"Still no problem" refers to *no problem* in both (i) dampness/mould and (ii) wintertime heating/keeping warm in both DCWs.

"Improved to no problem" refers to a change from having one or both problem(s) at the 8-year DCW to *no problem* at the 12-year DCW.

"Became/still a problem" refers to a change from *no problem* in at the 8-year DCW to having one or both problem(s) at the 12-year DCW, or having one or both problem(s) at both DCWs.

S6. Geographical distribution in 12Y DCW

Table S1. New Zealand regions and number of young people in 12Y DCW

NZ 16 regions	Regions in this paper	n	%
Auckland	Auckland	2497	56.6
Bay of Plenty	Bay of Plenty	173	3.9
Gisborne	Hawke's Bay-Gisborne	49	1.1
Hawke's Bay			
Manawatu-Whanganui	Manawatu-Whanganui	71	1.6
Northland	Northland	89	2.0
Canterbury	Southland	152	3.4
Marlborough			
Nelson			
Otago			
Southland			
Tasman			
West Coast			
Taranaki	Taranaki	31	0.7
Waikato	Waikato	1315	29.8
Wellington	Wellington	36	0.8
Total		4413	

Note: 122 young people did not have information on their residential NZ region in the 12-year DCW.

S7. Sensitivity analysis: ethnic and socioeconomic disparities on recent residential mobility and private rental tenure

After excluded young people who lived in a private rental in the 8-year DCW,

- Higher residential mobility (two times or more) was still more common among rangatahi Māori (27% [23-30%]) and Pacific young people (25% [21-29%]) than sole European young people (12% [11-14%]);
- the number of residential mobility was still associated neighbourhood deprivation ($p < .001$) and material hardship ($p < .001$).

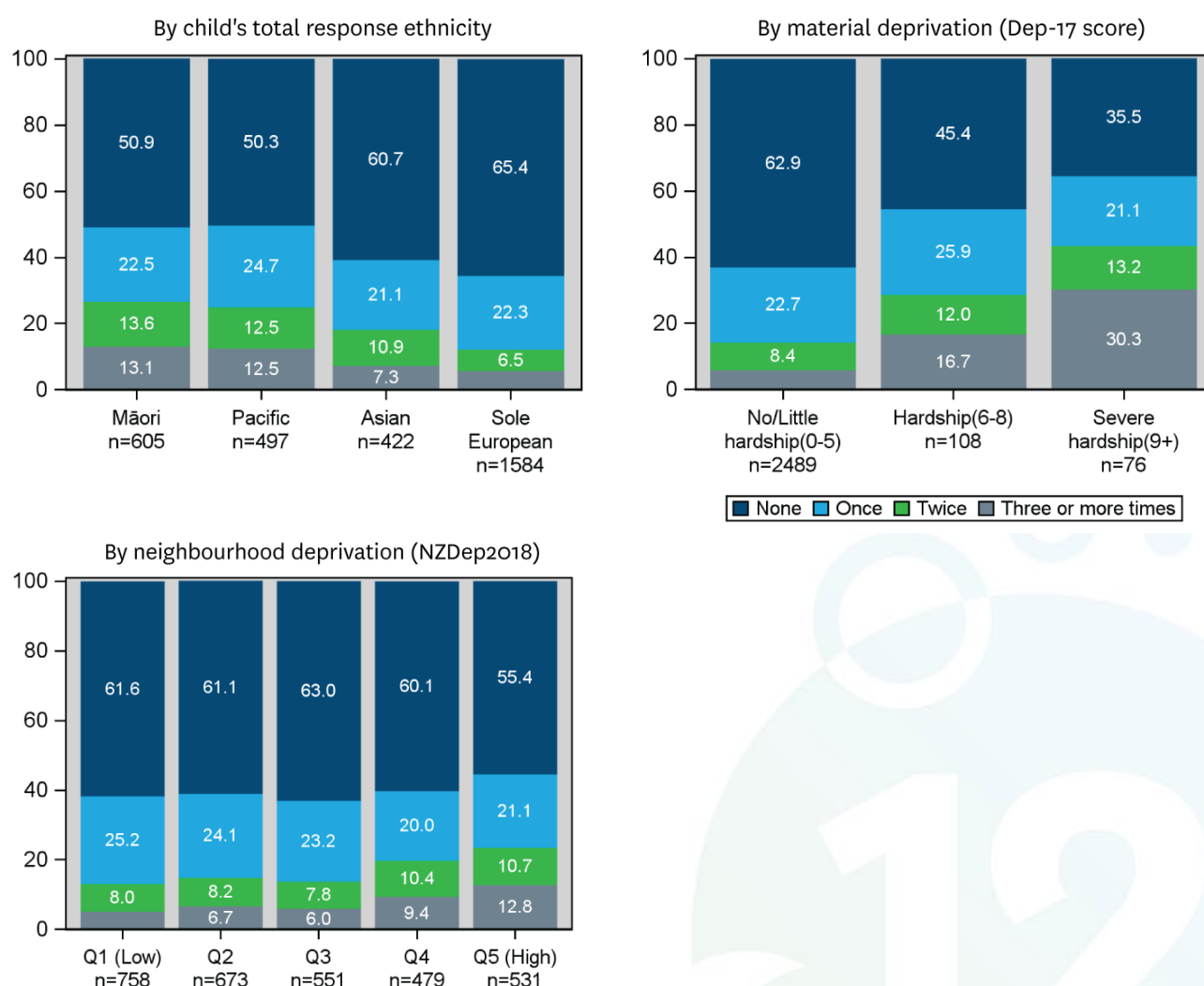


Figure S5. Proportion (%) of young people who had residential moves between 8-year and 12-year DCW: among those who did not live in private rental in 8-year DCW

S8. Main reasons for moving homes recently

a. Categories of main reasons for moving homes

Improvement moves were those where respondents indicated that the main driver for their move was to improve their living conditions. This category included:

- Moving to a bigger property/house
- Buying a new house
- Wanting to move to a different neighbourhood
- Moving to a warmer, drier and/or safer house

Involuntary moves were those where the main driver was likely outside the respondents' control. This category included:

- Living in a rental property and was sold
- Breakdown of a relationship or marriage that necessitated a move
- Moving for financial reasons
- Tenancy termination (for a reason other than the rental property being sold)
- Rent increased for rental property

Practical moves were those where respondents indicated that the primary driver for their move was not necessarily to do anything with their home but in response to other factors in their life that they have potential agency over. This category included:

- Moving for employment reasons
- Moving closer to a particular school
- Moving closer to family support or moving in with family
- Moving into a smaller property/house

All other reasons for move were categorised into "**other reasons**".

b. Main reasons for moving homes and sociodemographic variables

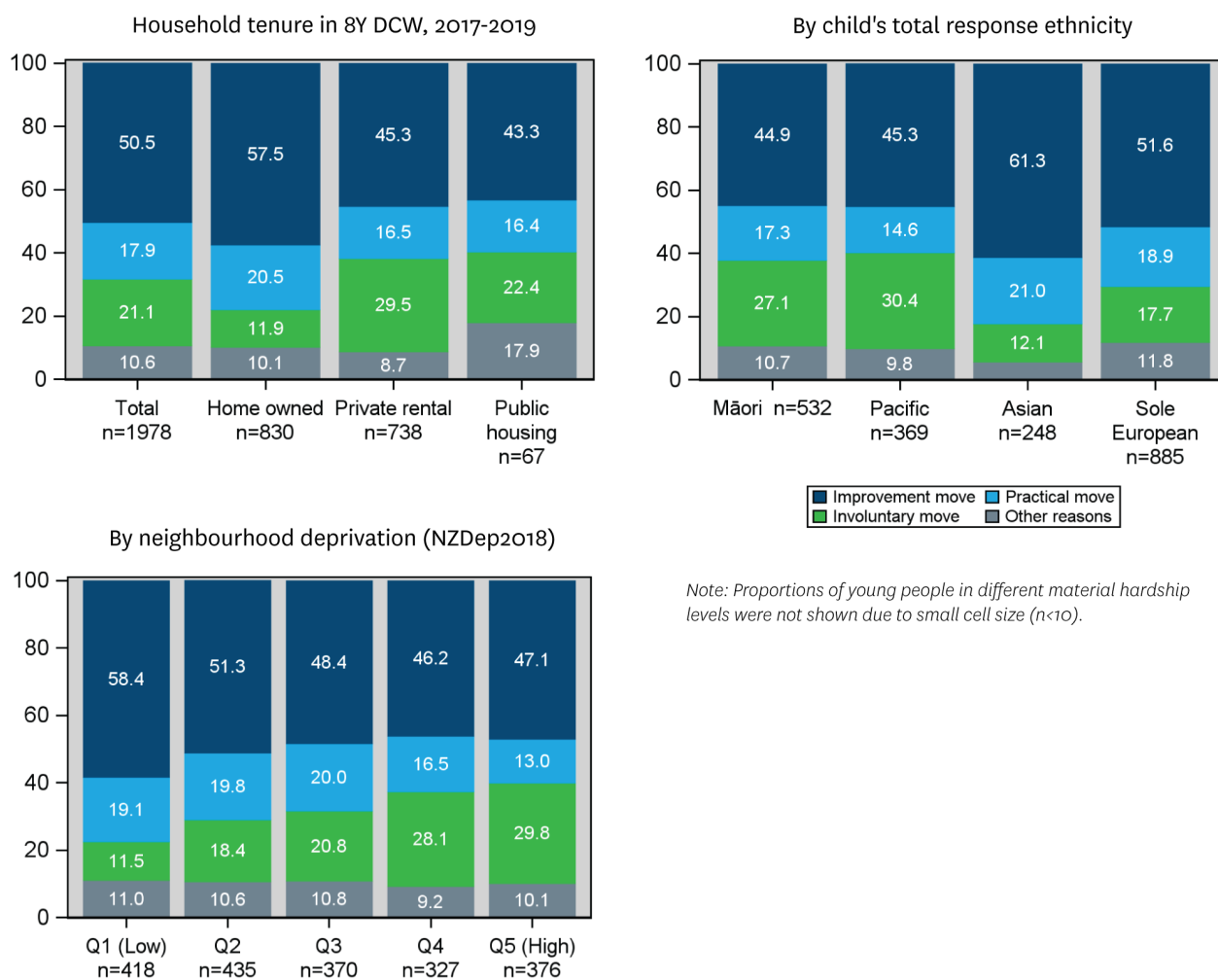


Figure S6. Proportion (%) of young people who had the main reason for residential moves between 8-year and 12-year DCW - by household tenure in the 8-year DCW, ethnicity, neighbourhood and household material deprivation

c. Main reasons for moving homes and housing quality

We also examined whether the type of move was related to aspects of housing quality in the 12Y DCW, including problems with dampness/mould and problems with heating/keeping the house warm in winter. Young people who had moved for improvement reasons were less likely to report problems with housing quality (20-22%), followed by practical moves (26-31%) and involuntary moves (39-43%) ($p < .001$). Young people who made an involuntary move due to increased rent were the most likely to experience the damp and cold problem (70%) (Table S2).

Table S2. Proportion (%) of young people who lived in homes with minor/major problems

	Dampness/mould problem (%)	Heating/warming problem in winter (%)
Improvement moves	22	20
Bigger property	23	19
Bought a house	18	19
Different neighbourhood	31	21
Warmer/drier/safer	21	26
Involuntary moves	43	39
Rental being sold	43	40
Relationship breakdown	32	33
Financial	47	37
Tenancy termination	52	50
Increased rent	70	70
Practical moves	31	26
Work	29	24
Closer to school	25	22
Family support / move in	43	36
Smaller property	18	27

S9. Severe housing deprivation

a. Sensitivity analysis: selected reasons for moving homes and severe housing deprivation

We found that severe housing deprivation is associated with residential mobility (Figure 7b). In order to make sure that our findings on severe housing deprivation were not affected by those who were able to afford expensive options in housing improvement, we excluded those who had moved homes due to wanting a bigger property or having bought a house. After the exclusion, the proportion of young people who had experienced severe housing deprivation (Figure S7) remained similar to the original findings (Figure 7a).

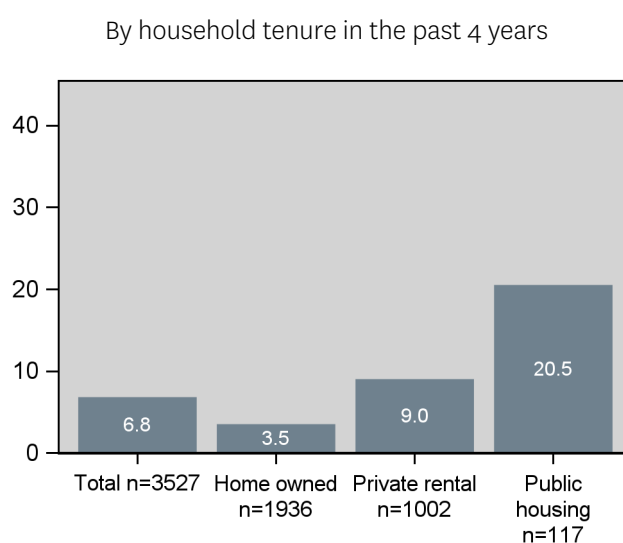


Figure S7. Proportion (%) of young people who had one or more experience(s) of severe housing deprivation between 8-year and 12-year DCW: among those who had moved homes not because of wanting a bigger property or having bought a house

b. Severe housing deprivation and stability of public housing tenure

By public housing tenure changes (8 to 12 DCW)

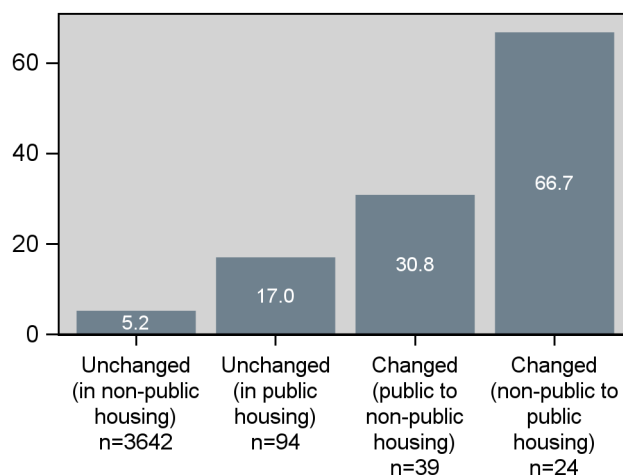


Figure S8. Proportion (%) of young people who had one or more experience(s) of severe housing deprivation between 8-year and 12-year DCW – by changes in public and non-public housing tenures recently

Young people who had switched between public and non-public housing at both the 8-year and 12-year DCWs were most likely to experience homelessness ($p < .001$).³ About two-thirds of young people who changed tenures from non-public to public housing and one-third of those who switched from public to non-public housing between 8-year and 12-year DCW had experienced homelessness, compared to 5% of young people who stayed within non-public housing tenures and 17% who stayed in public housing.

³ "Non-public housing" included those who lived in their own homes, private rentals or other situations.

c. Severe housing deprivation and rurality

Young people who lived in a large urban area (population size 30,000 – 99,999) were more likely to have experienced severe housing deprivation (14%) compared to those who lived in major urban areas (i.e., larger cities) (7%) or in rural settlements (9%) ($p < .001$). Large urban area is the second large category in the Rurality UR2018 Classification:

Statistical standard for geographic areas 2018 urban rural indicators

UR2018 category	Population size
Major urban area*	100,000 or more
Large urban area*	30,000 – 99,999
Medium urban area	10,000 – 29,999
Small urban area	1,000 – 9,999
Rural settlement	Represents a reasonably compact area with an estimated resident population 200-1,000 or at least 40 residential dwellings and containing at least one communal or public building
Other rural	Areas not otherwise categorised

*Major urban areas include Auckland, Hamilton, Tauranga, Lower Hutt, Wellington, Christchurch, and Dunedin.

#Large urban areas include Whangarei, Hibiscus Coast, Rotorua, Gisborne, Hastings, Napier, New Plymouth, Whanganui, Palmerston North, Porirua, Upper Hutt, Nelson, and Invercargill.⁴

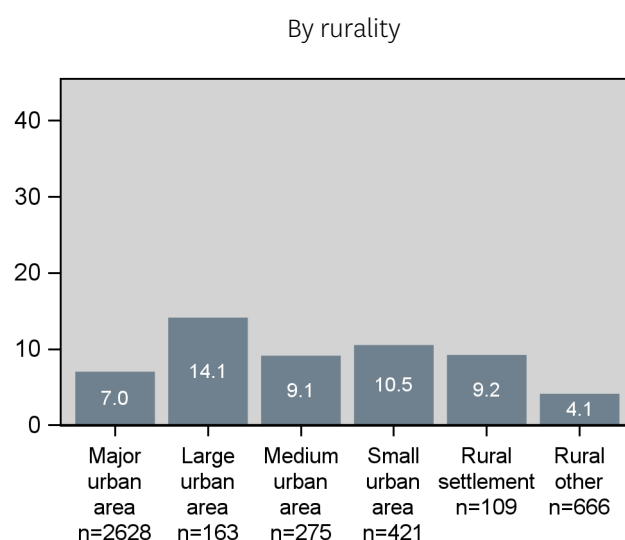


Figure S9. Proportion (%) of young people who had one or more experience(s) of severe housing deprivation between 8-year and 12-year DCW – by rurality

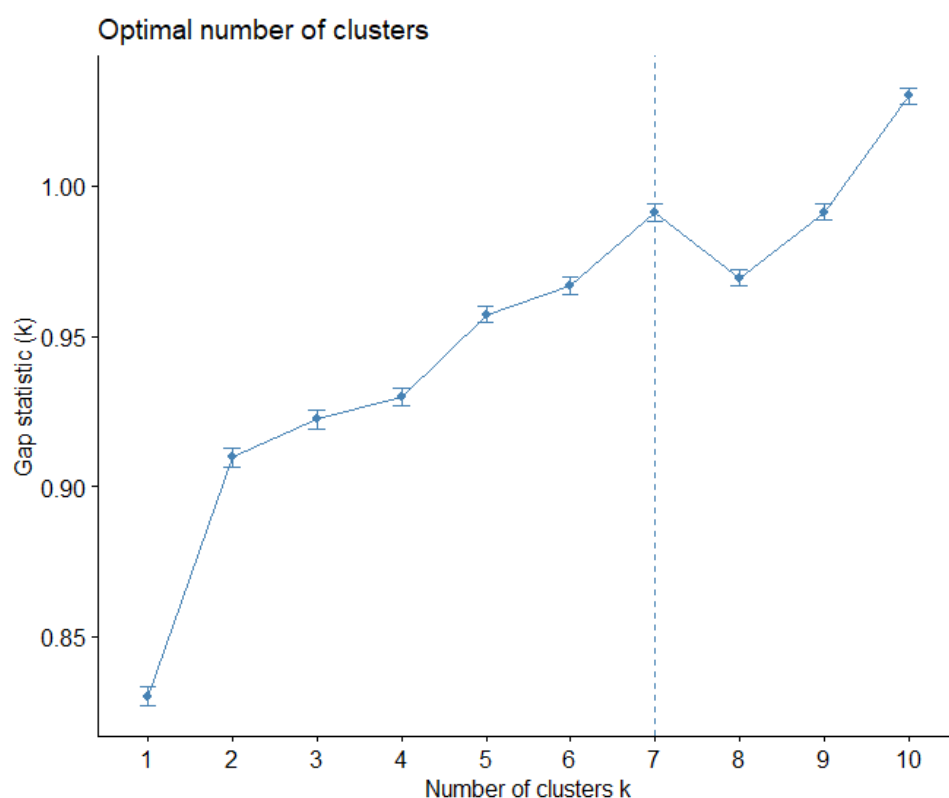
⁴ https://en.wikipedia.org/wiki/Urban_areas_of_New_Zealand

S10. Background information on residential mobility from antenatal period to 12-year DCW

	Data collection wave	Period of moving home	Year
Y8-Y12	12-year	From 8-year to 12-year	2017-2022
M54-Y8	8-year	From 54-month to 8-year	2013-2019
Y2-M54	54-month	From 2-year to 54-month	2011-2014
M9-Y2	2-year	From 9-month to 2-year	2010-2012
AN-M9	9-month	From antenatal period to 9-month	2009-2011

S11. Testing cluster solution quality - to determine the number of clusters in the state sequence analysis

Method: K-means algorithm and Gap statistics (R package)





S12. Future directions

- How does the state housing revamp in recent years in Auckland affect the distribution of house quality of public housing in different suburbs?
- What is the proportion of households that have received the Winter Energy Payment and how does it help to improve heating/keeping home warm in winter?
- What is the proportion of dwellings that might be exempted from the insulation requirement of Healthy Homes Standards?
- Did the government's rental tax policy affect the proportion of involuntary moves due to living in a rental property being sold?
- What are the factors that can explain the decrease in number of moves after the transition-to-school period?
- How do the longitudinal clusters of residential mobility affect cognitive and behavioural outcomes in young people?
- What are the longitudinal patterns of warm and dry housing conditions since the cohort children were born?
- Is there a relationship between addiction issues and severe housing deprivation?



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