School of Economics and Finance

Housing Precariousness and the Wellbeing of Australian Adults

Jack Hewton

0000-0002-3991-9909

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made. This thesis contains no material which has been accepted for any other degree or diploma in any university.

Authorship Attribution Statement:

Chapter 5, "The Effect of Tenure Insecurity on Wellbeing", is the basis of a journal article co-authored with Prof. Rachel Ong ViforJ and Dr. Sherry Bawa that has been submitted for publication and is currently in revision.

Material in chapter 6 and 7 of this thesis will be incorporated into a final report entitled "Precarious housing, housing assistance and wellbeing: a multi-dimensional investigation" for submission to the Australian Housing and Urban Research Institute. This report is headed by Prof. Rachel Ong ViforJ and co-authored by Dr. Ranjodh Singh, Prof. Emma Baker and Prof. Rebecca Bentley.

Name: Jack Hewton

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Abstract

This thesis will generate a comprehensive evidence base that offers an up-to-date national picture on the links between housing precariousness and wellbeing. Specifically, this thesis will address three key research questions. Firstly, how does tenure insecurity affect the wellbeing of Australian adults and does this effect differ by income status, gender and age? Secondly, which dimensions of housing precariousness have the largest impact on the wellbeing of Australian adults, and which dimensions of wellbeing have the largest impact on housing precariousness? Thirdly, how is overall wellbeing affected by housing precariousness and how is overall housing precariousness affected by wellbeing? What are the factors that affect both overall housing precariousness and wellbeing?

The thesis draws from waves 1 – 18 (2001 – 2018) of the Household, Income and Labour Dynamics in Australia (HILDA) survey, a nationally representative longitudinal survey that follows households and individuals annually. It investigates housing precariousness across the following four dimensions – tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods. Four broad domains of wellbeing outcomes are analysed via a range of satisfaction scores and SF-36 health measures that measure mental, emotional, physical and social wellbeing.

A variety of quantitative methodologies are applied in this thesis to unpack the links between housing precariousness and wellbeing outcomes. These include panel data modelling techniques for both linear and non-linear specifications, and the use of interaction terms to unpack how the links between housing precariousness and wellbeing vary across different socio-demographic groups. Additionally, given that housing precariousness and wellbeing are both multi-dimensional entities, principal component analysis (PCA) and exploratory factor analysis (EFA) are deployed to construct and analyse housing precariousness and wellbeing indices that can be tracked over time.

The analysis addressing the first research question reveals that tenure insecurity has a highly significant negative impact on the wellbeing domains of financial satisfaction and psychological distress. Modelling of the bi-directional relationships between *separate* precarious housing and wellbeing indicators for the second research question, shows that the financial satisfaction of those in unaffordable housing has suffered significantly over

the period, while satisfaction with one's home and finances are the strongest predictors of forced moves, unaffordability and overcrowding. Analysis of *overall* housing precariousness and *overall* wellbeing for the third research question reveals that unaffordable housing results in the greatest decline in overall wellbeing, while satisfaction with home is the strongest indicator in predicting overall housing precariousness levels.

The PCA results highlight that neighbourhood crime and hostility as the two forms of housing precariousness that have the strongest influences on overall housing precariousness. Meanwhile, mental health, role-emotional, vitality and social functioning are the main drivers behind overall wellbeing. Similarly, the EFA findings highlight that neighbourhood crime and hostility, as well as overcrowding, explain 87% of the variance in the precarious housing latent construct. Furthermore, the mental health, role-emotional, vitality and social functioning domains explain over 80% of the variance in the latent construct of wellbeing.

Various policy implications can be drawn from the thesis' research findings to alleviate housing precariousness and therefore, improve the population's wellbeing. For instance, fixed and longer lease terms and the removal of without-grounds eviction can improve tenure security. The results also highlight the need for policies that focus assistance on low-income individuals as they are more vulnerable to the negative impacts of tenure insecurity than the rest of the population. The bidirectional relationship indicates the importance of not only providing better housing conditions to benefit wellbeing, but to additionally deliver policies that improve wellbeing to reduce the chance of individuals experiencing precarious housing.

Acknowledgement

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Chapter 1 – Introduction

1.1 Thesis Aim

This thesis aims to explore the relationship between housing precariousness and wellbeing in three major pieces of analysis. The first piece focuses on one form of precarious housing, the second piece compares four different forms while the third piece attempts to look at overall housing precariousness. This leads us to three key research questions being addressed in this thesis:

1. How does tenure insecurity affect the wellbeing of Australian adults and does this effect differ by income status, gender and age?
2. Which dimensions of housing precariousness have the largest impact on the wellbeing of Australian adults? Which dimensions of wellbeing have the largest impact on housing precariousness?
3. How is overall wellbeing affected by housing precariousness and how is overall housing precariousness affected by wellbeing? What are the factors that affect both overall housing precariousness and wellbeing?

Issues of significant importance to the wellbeing of Australians and which have a place of prominence on the policymaking agenda are addressed in this thesis. An academic contribution is also made by filling gaps in the existing literature that link housing to wellbeing outcomes. These are set out in the rest of this chapter. Section 1.2 explains why the concept of wellbeing is crucial in designing policies while section 1.3 outlines the importance of housing in influencing the wellbeing of Australians. Section 1.4 describes key housing policies in Australia that are targeted towards addressing various forms of housing precariousness such as tenure insecurity and housing affordability. Section 1.5 identifies the gaps in the literature and explains how this thesis will fill them. Lastly, section 1.6 summarises the chapter and outlines what is to be expected from the rest of the thesis.

1.2 Why is the Concept of Wellbeing Important for Policymaking?

Wellbeing can be described as an outcome when individuals are able to lead fulfilling lives with purpose, balance and meaning to them. It is generally agreed in policy circles that even though economic growth is important, by itself it does not guarantee that there will be improvement to living standards. A key measure of economic growth – GDP growth – does not measure the actual quality of economic activity or take into account who benefits and who is left behind (NZ Treasury 2019). This is where the concept of wellbeing can play a key role, by providing policymakers an alternative metric to track progress that relates more closely to the quality of life of the population (NZ Treasury 2019). Furthermore, Schulte et al. (2015) argues that it is crucial to understand which aspect of wellbeing is being affected by a specific policy, to support better targeted policy measures.

Good health and wellbeing amongst the population benefits society generally. Hence it is regarded as an important contributor to economic and social development as well as towards supporting economic recovery (DHSC & PHE 2014; WHO 2013). High levels of wellbeing can increase life expectancy, improve the chances of positive health behaviours, and generate positive externalities (DHSC & PHE 2014), while also improving productivity (Schulte et al. 2015; WHO 2013). Conversely, poor wellbeing can waste potential and drain resources across different sectors within society (WHO 2013).

The budget that was handed down in New Zealand in 2019 was a recent wellbeing-focused policy attempt. As outlined by New Zealand's Treasury (2019), the budget was designed around six wellbeing-centric priorities. These include mental health, child wellbeing, supporting the Indigenous (Maori peoples) and migrants from the pacific islands (Pasifika), building a productive nation, transforming the economy and investing in New Zealand.

Another international policy example can be found in the case of the Organisation for Economic Co-operation and Development (OECD), which has an expressly stated goal to create better policies to better lives via improvements in economic and social wellbeing. The OECD's Better Life Initiative aims to enhance lives by developing

improved wellbeing metrics. In addition, they provide analyses to reduce the gap between existing wellbeing metrics and policy intervention (OECD n.d.b). Several member countries of the OECD such as Australia, Ecuador, France and Italy all deploy mechanisms and frameworks to integrate wellbeing metrics into policy making. Across these countries, different levels of government are responsible for ensuring wellbeing metrics are part of policy considerations. In Australia specifically, the Treasury developed a wellbeing framework in 2004 to support analysis and advice for the Treasury's policies (OECD 2018).

Further to these international examples, the Sarkozy report is a landmark document generated as a result of French President Nicholas Sarkozy's dissatisfaction with the measure of well-being at the time, such as GDP. Sarkozy tasked a commission to consider improved alternatives to measure social progress. The result was support for the use of subjective wellbeing measures as the basis for designing policies and assessing social progress (Easterlin 2010).

1.3 Why is Housing Important for Australian's Wellbeing?

Further to the points made in the previous section on why wellbeing is key in making policies, housing is equally as important. This is because it supports individuals to thrive and build a future, and everyone in society has a basic human right to a place that they can call home (ShelterWA 2018). Housing can be regarded as fundamental to all aspects of life. It provides a foundation for opportunities and enhances health and wellbeing, employment prospects and education options (Department of Housing 2010; ShelterWA 2018). Furthermore, access to appropriate and affordable housing can have flow-on effects in the form of reduced costs to government in areas such as health, mental health, justice, and crime. The housing sector also creates investment opportunities, stimulates the economy, and provides employment (ShelterWA 2018).

Within Australia, there has been a long-run decline in housing affordability, especially amongst those on low-to-middle incomes. This has been attributed to an increasing gap between the supply and demand for the low-cost end of the housing market in addition to

an overextended public housing system (Department of Housing 2010). A lack of access to affordable and secure housing can lead to precarious housing circumstances. COVID-19 has demonstrated how important this is for public health. For instance, Ong ViforJ and Leishman (2020) argue that increasing construction of social housing is crucial due to demand for affordable housing heavily outstripping supply. A benefit is that social housing reduces vulnerable persons' exposure to unhealthy conditions as well as transmission of diseases. For example, if a homeless person were to contract COVID-19, they do not have anywhere available to them that allows them to self-isolate without interacting with others.

Following on from this issue, there are several housing and health guidelines set out by the WHO (2018). These are based on the idea that the quality of an individual's housing can have major implications on their health and wellbeing. The WHO (2018) predict that the world's urban population is going to double by 2050 and therefore, the demand for housing is going to subsequently increase significantly. Thus, they argue that improving housing conditions as well as reducing health risks within the home are important goals to achieve.

1.4 Australian Policies that Address Housing Precariousness

This section explores housing policies in the Australian context that pertain to precarious housing issues, generally acknowledging the importance of housing to the wellbeing of the population. These include Australian private rental institutional settings, affordable housing policies, incentive schemes for landlords to provide secure tenures, the 'housing first' model framework and recent COVID-19 related policies.

1.4.1 Australian private rental sector and tenure insecurity

In Australia, the private rental sector is the second biggest form of tenure after owner occupation. In comparison, social housing is a much smaller tenure. This is similar to other countries such as New Zealand, Ireland, the United Kingdom (UK) and the United

States (US), though in Germany, the private rental sector is the largest tenure (Hulse et al. 2018). According to Martin et al. (2018), who conducted an international comparison of private rental institutional settings, the private rental sector in Australia is more lightly regulated and more likely to feature short-term leases than comparator countries. For instance, in Germany, there is strong tenure security via regulation of the scope for landlords to terminate leases. They are only able to provide a termination notice under specific circumstances and it is normal to have rental agreements run for an indefinite period of time, with the average length of tenancy in Germany being more than ten years. In Ireland, Spain and Belgium, there is greater tenure security due to the presence of long-term leases.

A common method of ensuring tenure security is to only allow landlords to terminate a lease on prescribed grounds, which is seen in Sweden, Germany, Scotland, some major US cities and most of Canada. Conversely, Australia, New Zealand, the UK (not Scotland) and some areas in the US still allow lease termination without a reason. Regarding rent increases, this is regulated in countries such as Belgium, Spain, Sweden, Germany, most of Canada and some US cities which limits landlords to a guideline on how they can change rental prices (Hulse et al. 2018; Martin et al. 2018).

While Australia's private rental market is lightly regulated, residential tenancy laws do exist to provide a legal framework within which landlord-tenant relationships must operate. There are Residential Tenancy Acts present in each state within Australia, playing a key role in providing and regulating tenure security for tenants in the private rental market. There are concerns, however, that they do not balance the rights of tenants against the rights of landlords appropriately (Hodgson et al. 2018; Payne and Durand-Lasserve 2012). To counteract this, there is currently a Make Renting Fair campaign across Australia. The aim is to advocate for policy changes to the relevant residential tenancy act within each state and territory. The Make Renting Fair Alliance (2019) has identified multiple key issues of concern to renters that would make renting better and fairer if they were addressed, suggesting changes such as ending unfair evictions, allowing pets and stabilising rent increases.

1.4.2 Affordable Housing Strategies

Around a decade ago, the West Australian government delivered the affordable housing strategy. This sets out their plan to increase the availability of affordable housing for Western Australians, especially to those with low-to-middle incomes. They aimed to achieve this through several initiatives such as assisting low deposit home buyers with Keystart and private rental brokerage schemes. The overall goal is to create more affordable housing options, better assessment of need and targeting of assistance. This is to ensure more individuals on low-to-middle incomes have access to housing that is affordable and appropriate for their needs (Department of Housing 2010).

The Western Australian housing strategy for 2020 – 2030 has just recently been announced towards the end of 2020 with the goal of connecting 150,000 households within WA to stable, sustainable and safe homes. It builds on the previously mentioned affordable housing strategy 2010 – 2020 and is a call to action for multiple sectors to work together. This is done in order to improve available housing choices and access to affordable and suitable homes, especially for the most vulnerable groups in society. This strategy focuses on refurbishing existing social housing, constructing new ones and delivering a regional maintenance program for existing ones (Department of Communities 2020).

Other state and local governments also have similar strategies to improve access to affordable housing. For instance, the goal of the City of Melbourne local government is to address the shortfall in affordable housing by bringing together a range of not-for-profit, government and market actors. To achieve this, the plan is to increase the supply of affordable rental housing within Melbourne which will be developed and managed by community housing organisations (City of Melbourne 2020).

1.4.3 Incentive Schemes for Landlords

There is currently an incentives program for private rentals in Tasmania that is running from 2019 to 2023. The aim is to encourage property owners to lease their home for a guaranteed term of two years in addition to making rents capped at 25% to 30% below

median rates to make it accessible to low-income households. In return, the landlords are paid a financial benefit on top of the guaranteed rent for period of the lease (Department of Communities n.d.a).

1.4.4 Housing First Model

The Housing First model is a framework that has been used around the world and has evidence across various countries that support it. The goal of this model is to essentially provide safe and permanent housing to homeless individuals as the first priority to getting their lives back on track. This model is premised on the principle that giving the homeless access to housing is more beneficial to the government cost wise when compared to placing them in a shelter or a high-intensity support service. There is also reduced costs to the health system as they are spending fewer days in hospital or psychiatric care as well as reduced costs for the justice system (AHURI 2018; Wood et al. 2016).

Another key aspect of this model is that individuals are not required to engage with support services to maintain their housing. This is vastly different to other approaches which demand the individual be free from drugs and alcohol or follow a mental health program as a condition for staying in the housing. This is done because it is argued that those approaches can make it difficult for individuals to become well enough to qualify for the housing or stay sober to remain in the tenancy (AHURI 2018; Wood et al. 2016).

This model has already seen success in Australia. A key project based on this model was conducted by Mission Australia between 2010 and 2013. This project found that after two years, 97% of project participants were still living in secure housing which reduces the financial burden on the Australian government and the health system, as well as vastly improving their wellbeing. However, the development of this approach in Australia has been limited due to a lack of appropriate affordable housing (AHURI 2018; Wood et al. 2016).

1.4.5 Recent COVID-19 Related Policies

Due to the global pandemic caused by the coronavirus (COVID-19) in 2020, all the states and territories across Australia introduced their own versions of moratoriums on residential tenancy evictions. The purpose is to protect tenants during this time, especially those in financial distress as a result of the pandemic. In Western Australia, legislation was passed to prevent tenants from being forced to move out of their residence or made homeless during this pandemic. Some aspects of this new law include a ban on rent increases during the moratorium period as well as fixed-term tenancies being converted automatically to periodic tenancies if it expires and another agreement hasn't been achieved (DMIRS 2020).

The Victorian and South Australian government also introduced temporary changes to their residential tenancy acts in response to COVID-19, similar to Western Australia. Features include tenants being protected from eviction if they fall behind on rent for COVID-19 related reasons and landlords unable to increase the rent during this time (SACAT n.d.; Tenants Victoria n.d.). However, these moratoriums are starting to end. For instance, the moratoriums in Western Australia, South Australia and Victoria are due to be lifted on the 28th March 2021 (DMIRS 2020; SACAT n.d.; Tenants Victoria n.d.)

1.5 Contributions to Gaps in the Literature

The previous section has highlighted key housing policies that are likely to be informed by this thesis' findings. This section goes on to highlight the ways in which this thesis addresses multiple gaps within the academic literature.

Firstly, there is already extensive quantitative literature on the effect of tenure insecurity on children's outcomes, although there is not as much on the outcomes of adults. Furthermore, this thesis explores tenure insecurity not only as a domain of housing precariousness, but additionally as a negative form of residential mobility. Thus, the two aspects of tenure insecurity are compared with four other forms of residential mobility to address research question 1, with most previous studies only covering one or two forms (Desmond and Kimbro 2015; Tunstall et al. 2015).

The second key research question of this thesis fills a gap by covering a wider range of precarious housing dimensions than previous studies have done. Most studies in the literature do not quantitatively analyse all four domains of housing precariousness addressed in this thesis. For instance Mallett et al. (2011), Baker et al. (2019) and Clair et al. (2019) analysed quantitatively two or three forms of housing precariousness, but not four. One study by Baker et al. (2017) came close. However, the data is from a single year (2013), has a low sample size of around 1,000 and was collected in South Australia only. This thesis covers a larger time period with 18 years of analysis up to a recent year of 2018, also painting a national picture drawing on a sample that exceeds 269,000 person-year observations.

The second key research question of this thesis also sheds light on the bi-directional relationship between housing precariousness and wellbeing, which few studies have attempted. Research conducted by Mallett et al. (2011) and Baker et al. (2014) did attempt this, however, they use a smaller range of housing precariousness and wellbeing measures and covers a lesser period of time. The relationship between precarious housing and wellbeing is important to investigate in both directions. This is because it uncovers whether precarious housing issues have a higher likelihood to impact wellbeing, or whether those with low levels of wellbeing have a higher likelihood to experience issues with their housing.

Furthermore, few studies have generated a precarious housing index that covers all four aspects of precarious housing examined in this thesis. The third research question of this thesis combines tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods into a precarious housing index. Again, Baker et al. (2017) is the only study found that came close with their index of housing insults, but as mentioned earlier, their data is limited. This thesis goes even further by constructing a wellbeing index derived from a combination of Short-Form 36 (SF-36) health and life satisfaction measures, which has not been attempted by previous studies.

In general, this thesis offers an up-to-date evidence base from 2001 to a very recent year of 2018. The evidence base is highly comprehensive, as it covers nine wellbeing outcomes, which is a much more extensive range than covered by previous studies (see

for example Mallett et al. 2011; Pinney 2013; Richardson et al. 2016). By analysing so many different forms of precariousness and wellbeing within this thesis, the relationships that are the most important and those that are not can be highlighted. This has not been possible in previous studies that do not conduct such a comprehensive investigation.

1.6 Chapter Summary and Thesis Outline

This thesis addresses issues that are of policy importance as they affect the wellbeing outcomes of everyday Australians. It also makes an academic contribution by filling some gaps in the existing literature that link housing to wellbeing outcomes. The previous sections describe why wellbeing is an important ingredient in policymaking agendas, why housing is important to Australians' wellbeing, and housing policies that relate to precarious housing in Australia. Moreover, the contributions of the thesis to gaps in the literature have been highlighted.

The rest of this thesis is constructed in the following way: Chapter 2 discusses the conceptual framework, outlining the concept of subjective wellbeing, its history and how it is measured. This chapter also defines various forms of housing precariousness including tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods. Chapter 3 offers an international review of the literature on housing precariousness. Chapter 4 describes the methodology common to the whole by describing the dataset used, the sample generated, the key variables constructed and different model techniques and specifications deployed. Chapters 5, 6 and 7 specifically address research questions 1, 2 and 3 of the analysis. Finally, chapter 8 provides a conclusion that highlights the potential policy implications of the findings, critically assesses the limitations of this thesis, and sets out directions for future research.

Chapter 2 – Conceptual Framework

2.1 Scope of Conceptual Framework

The primary goal of this chapter is to outline the conceptual framework surrounding subjective wellbeing and housing precariousness. The chapter is set out as follows, section 2.2 explains the theory of subjective wellbeing, in addition to the history behind it. Section 2.3 covers the measurement of subjective wellbeing. Section 2.4 describes the concepts in relation to housing precariousness and the four domains of tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods. Section 2.5 presents theories that attempt to conceptualise the links between wellbeing and precarious housing. This chapter then finishes with section 2.6, which summarises the chapter.

2.2 Subjective Wellbeing

Defining subjective wellbeing has been seen to be a complex subject, but generally can be related to an individual's self-reported assessment of their own overall wellbeing and satisfaction with life (Clapham et al. 2018; Easterlin 1974; Maggino 2015; Pontin et al. 2013). The concept of subjective wellbeing has grown in importance and popularity in recent years. Various studies such as Pontin et al. (2013) have argued that objective indicators such as employment rates and education shares do not take into account human perception or experience, which plays a key role in understanding one's wellbeing. However, Easterlin (1973) found that there are three broad realms that individuals judge their personal happiness on – economic matters, family considerations and health. Economic matters are generally the most frequently present, which could explain why high-income individuals are generally happier than those with a low-income.

The theory of subjective wellbeing can be traced back to the late 1700s and 1800s where moral philosophers found the 'greatest happiness principle'. They describe utility as human happiness, as well as concluding that society should be aiming for the greatest happiness for the greatest number of people (Dominko and Verbic 2019). Because happiness has been considered the ultimate goal in life, subjective wellbeing then became an important area of research in different contexts and across various disciplines such as

medicine and psychology (Dominko and Verbic 2019; Tibesigwa et al. 2016). Easterlin (1974) was an important early economics study that explored subjective wellbeing empirically. However, at the time, very few economists were influenced by his ideas. This was due to standard economic theory rejecting these subjective measures of wellbeing.

In the late 1900s, the idea of subjective wellbeing took off amongst economists, widely propagated by Easterlin who became known as the 'father' of the economics of happiness (Singh 2018). It started with articles examining the relation between income and happiness. Around this time period, the famous Easterlin paradox' was established, which posits that increasing the average income does not necessarily lead to an increase in well-being (Easterlin 1973; Easterlin 1974).

The Easterlin paradox is depicted in figure 2.1, which displays personal happiness ratings by gross national product (GNP) per head of 14 countries. These results show a lack of systematic association between income and happiness (Easterlin 1974). The Easterlin paradox is further illustrated in figure 2.2, which GDP per capita growth rates by financial satisfaction for a worldwide sample of 37 countries. This figure highlights an absence of significant relationships between improvement in life satisfaction, and the rate of economic growth (Easterlin et al. 2010). Furthermore, recent studies by Easterlin et al. (2010) have found that in the short-term, happiness and subjective wellbeing are positively related. Conversely, over the long-term (10 years+), there is little or no relationship evident.

Figure 2.1: Personal happiness rating and GNP per head, 14 countries.
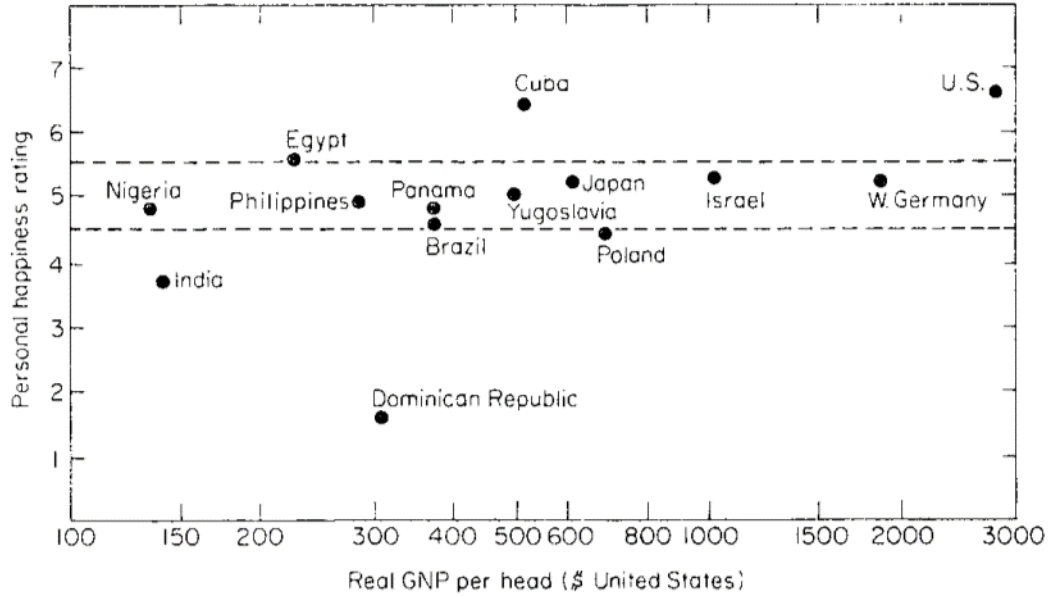
Source: Figure reproduced from Easterlin (1974, 106)

Figure 2.2: Average annual rate of change in life satisfaction and in GDP per capita
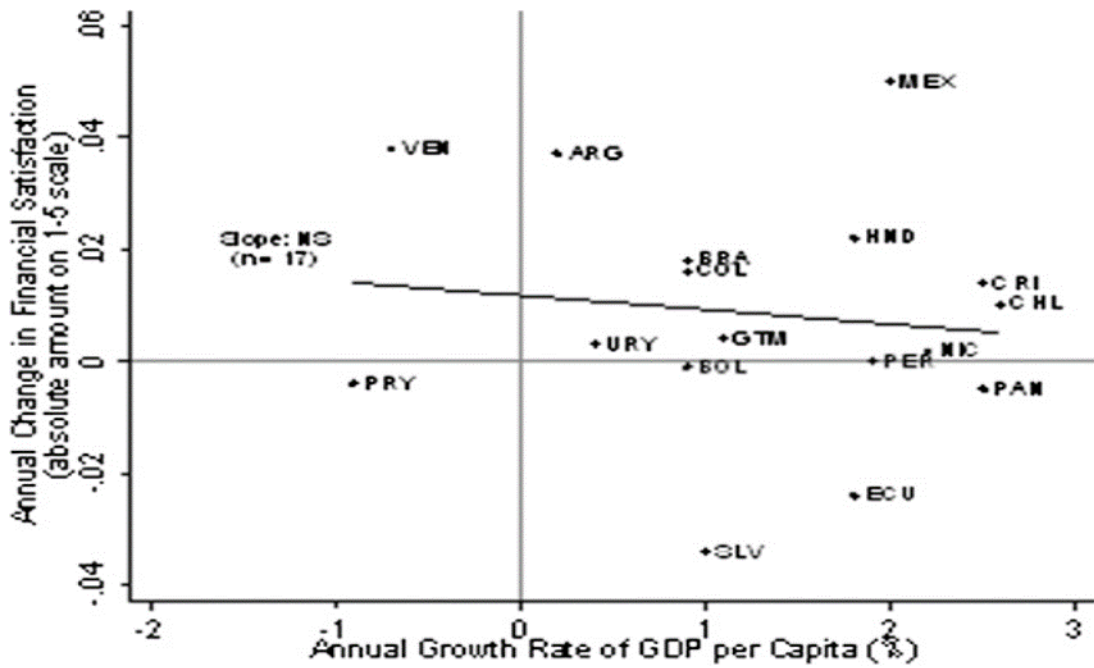
Source: Figure reproduced from Easterlin et al. (2010, 22464)

In 1997, the Economic Journal published a symposium which led to a greater general awareness within the economics discipline on the theory of subjective wellbeing. This in turn resulted in economists starting to perform empirical research on the determinants of subjective wellbeing in different countries and time periods. In the early 2000s, economics research was starting to be conducted on how different economic indicators such as unemployment, inequality, inflation and income have an effect on happiness. There was also a substantial increase in subjective wellbeing research after the Global Financial Crisis (GFC) in 2008, with more and more researchers starting to question the standard economic theory approach to wellbeing. This increase in subjective wellbeing research additionally lead to a broadening of the scientific field with new topics emerging. However, key aspects such as income, performance, job and financial satisfaction and unemployment were all still regarded as important (Dominko and Verbic 2019).

2.3 Measuring Subjective Wellbeing

The measurement of subjective wellbeing within the literature is usually conducted via self-reported health and satisfaction outcomes.

2.3.1 Measuring Satisfaction

Satisfaction has been regarded as a key factor in explaining the concept of subjective wellbeing, due to it being a measure of an individual's own perceived thoughts or aggregate judgement of their life situation (Binder 2014; Diaz-Serrano 2009). The dimensions of satisfaction range from financial to housing satisfaction, which all fall under the general realm of life satisfaction (Diaz-Serrano 2009).

In order for Easterlin et al. (2010) to measure financial satisfaction in their study, they used a question that asked respondents to rate their current family economic situation on a scale of 1 – 5, a score of 5 indicating very good and 1 indicating very bad. In another study, financial satisfaction is measured by a 10-point scale with the question asking participants how satisfied they are with their current personal financial condition in

relation to assets, debts and savings (Xiao et al. 2014). Additionally, Ali et al. (2015) outlined two questions that are commonly used within the literature to measure financial satisfaction. The first being, how satisfied one is with their financial situation, and the second being how comfortable and well-off one is financially.

Regarding housing satisfaction, a simple way of measuring this domain employed by Lane and Kinsey (1980) is to ask participants "all things considered, were they satisfied or dissatisfied with their house or apartment as a place to live". Another method of measuring satisfaction with housing is applied by Van Straaten et al. (2017), who asked their participants how they felt about the prospect of living in their current dwelling for a long period of time.

2.3.2 Measuring Mental and Emotional, Physical and Social Health

The SF-36 measure is a popular method of measuring various aspects of wellbeing within the literature. It is a short-form health survey containing 36 different questions, in turn providing eight different sub-scales, in addition to providing a physical and mental health summary measure. The SF-36 measures' main usefulness is comparing general and specific populations, as well as differentiating the health benefits that are produced by different treatments. The eight different sub-scales are split into physical and mental health categories. Physical health consists of physical functioning, role limitations due to physical problems, bodily pain and general health. The mental health domain contains vitality, social functioning, role limitations due to emotional problems and mental health. Each of these sub-scales are measured on a scale of 0 – 100, with higher scores representing better wellbeing (Ware 2000). This SF-36 measure has been deployed in various studies within the housing literature, including Baker et al. (2012), Baker et al. (2014), Bentley et al. (2011) and Smith et al. (2017).

One of the popular methods of measuring psychological distress is the Kessler 10 psychological distress scale (K10). This scale is made up of 10 questions that provides an overall score ranging from 10 to 50, aiming to indicate the levels of psychological distress in the individual. A common technique of classifying the score ranges is that a score of

10 – 15 indicates low levels of distress, 16 – 21 medium levels, 22 – 29 high levels and 30 – 50 very high levels of distress (Bu et al. 2017; Pereira et al. 2019). Therefore, higher scores on the K10 scale represent higher levels of psychological distress and thus, lower wellbeing.

2.4 Housing Precariousness

Four key forms of housing precariousness – tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods – have all been found in the literature to adversely affect the health and wellbeing of the population (see chapter 3). The concepts of these four domains are be explored here.

2.4.1 Tenure insecurity

The concept of tenure security can be defined as the right of the population to effective protection by the government against forced evictions. An individual has access to secure tenure when they are protected from involuntary removal from their residence, except in certain circumstances that are done via a legal process (Minnery et al 2003; Payne and Durand-Lasserve 2012).

Tenure insecurity can also be viewed as a multi-dimensional concept, with Hulse and Saugeres (2008) identifying six different dimensions in their research. These include lack of physical comfort, lack of privacy, lack of belonging, feeling unsafe, housing instability and housing mobility, which are also all noted to be somewhat interrelated. Concerning anxiety and depression, involuntary residential mobility, lack of privacy and feeling unsafe were found to be the main dimensions of housing insecurity to contribute to or exacerbate these issues. Regarding physical health problems, lack of belonging, privacy and physical comfort appeared to be the more influential factors and are further compounded when residing in homes or neighbourhoods perceived as unsafe (Hulse and Saugeres 2008).

Insecurity across these various dimensions defined by Hulse and Saugeres (2008) increases the difficulty for individuals to either engage in study or paid work. This then contributes and reinforces their financial insecurity, making it more challenging for individuals to search for and keep paid employment if they have to move frequently or experience housing instability. Furthermore, insecurity such as mobility, instability and a lack of belonging is seen to negatively affect social participation. These factors can be a detriment for families and their social connectedness, with a lack of safety within the neighbourhood or home also being an obstacle (Hulse and Saugeres 2008).

Tenure security can be linked back to the concept of secure occupancy. This refers to the nature of the occupancy in a residential dwelling, and the extant that households can turn a place into a home as well as remain there for a reasonable period of time if they desire it, as long as they meet their obligations. In Hulse et al.'s (2011) report, they classify secure occupancy under four different perspectives that influence the experience and perception of secure occupancy in rental housing. Firstly, the market lens considers the capacity of the household to access affordable and suitable rental housing. Secondly, the legal lens focuses on terms and conditions as well as rights and responsibilities of rental occupancy. Thirdly, the social policy lens concerns the household's capacity to remain in rental housing and their wellbeing. Lastly, the socio-cultural lens takes into consideration cultural norms with occupancy of rental housing.

On the one hand, housing-related forced mobility can be classified as individuals experiencing forced moves such as evictions, which could be for little or no reason and at short notice, or the property no longer being available due to landlord moving in, selling, doing renovations or rebuilding (Beer et al. 2019; Desmond and Kimbro 2015; Productivity Commission 2019). Some of the reasons for evictions that are used in various studies include homeowners being foreclosed by the bank for failing to meet mortgage payments, or renters being evicted due to late payment or nonpayment of rent (Comey et al. 2012; Tunstall et al. 2015; Vasquez-Vera et al. 2017).

Tenure insecurity is often associated with the private rental sector. In fact, within the private rental sector, there are two key groups of renters. The first are individuals who prefer renting as it provides a flexible option without being locked into one house. This

group wants the option to be able to move between jobs and cities with ease, or they are not interested in the responsibilities that are associated with home ownership. The second group contains individuals and families who have constrained housing circumstances, including households who want to buy, but cannot afford to do so, or those who have fallen out of home ownership. In Australia, a vast portion of the rental sector falls into the second groups, in particular low-income households who are limited in their housing choices as a result of their income levels, which can additionally be compounded by other factors such as family size, ill health, disability or support needs (Hulse et al. 2011).

Those who reside in the private rental sector are often regarded as insecure due to being exposed to the factors mentioned, with homeowners and those in public housing considered as being more secure as they are not generally subject to these insecurities (Hodgson et al. 2018; Productivity Commission 2019; Robinson 2013). Individuals who own their own home are less likely to move compared to private renters. This is due to the former having more control over their living environment. However, a consequence of this is that it makes them less mobile, due to having high costs of moving compared to renters (Basolo and Yerena 2017).

Overall, the light regulatory settings in the private rental sector described in chapter 1 have contributed significantly to widespread tenure insecurity in the sector. No grounds evictions, short minimum notice periods, and short lease lengths are some of the biggest threat to housing security for private renters (Productivity Commission 2019).

Studies on tenure insecurity straddle both the housing precariousness and residential mobility literature, and this is further explored via addressing the first key research question in chapter 5. Being forced to move frequently or being faced with short-term leases is usually viewed as a negative form of residential mobility and a form of housing precariousness at the same time. One possibly positive factor associated with tenure insecurity in the context of residential mobility is employment opportunity. The more mobile an individual is, the easier it allows them to chase up employment opportunities because it makes relocation to areas with abundant employment opportunities more accessible (Fauth et al. 2004; Fauth, et al. 2008; Rowley and James 2018).

2.4.2 Unaffordable Housing

In order to describe a standard of affordability, Czischke and van Bortel (2018) draw on various definitions from the literature. Essentially, housing costs should not exceed a fixed proportion of household income, there should be adequate household income remaining to meet other basic living costs. If an individual were to experience unaffordable housing, this could lead to them making tradeoff decisions between essentials due to the lower amount of economic resources available to them. For example, having to decide between transportation, which could affect education or employment opportunities, nutritious food and medical care (Bentley et al. 2011; Czischke and van Bortel 2018; Singh et al. 2019).

Hence, housing unaffordability can be described as when housing costs take up a significant proportion of an individual's income, with spending greater than 30% seen as a common benchmark (Baker et al. 2014; Pierse et al. 2016; Productivity Commission 2019). The most common definition of unaffordable housing in the Australian literature is the "30/40 rule". This rule states that a household is in unaffordable housing when the household spends greater than 30% of household income on housing costs (rent or mortgage) and is in the lowest 40% of the national equivalized disposable income distribution (Baker et al. 2014; Beer et al. 2016; Bentley et al. 2016). There are some studies that describe unaffordable housing using a broader definition, such as spending greater than 30% of household income on housing costs regardless of whether the household is in the lowest 40% of the income distribution (Bentley et al. 2011; Clair and Hughes 2019; McConnell 2017). Other studies consider subjective measures, such as individuals self-reporting whether their housing costs are a financial burden (Andersen et al. 2017; Clair et al. 2019; Nolan and Winston 2011).

2.4.3 Unsuitable Housing

The unsuitable housing aspect of housing precariousness commonly refers to housing issues related to the quality or condition of the house (Clair et al. 2019; Mallett et al. 2011; Ziersch et al. 2017). This includes factors such as leaks, dampness, water damage,

mould, pest infestations, issues with plumbing, issues with electrics, cleanliness and structural problems. These issues are either self-reported or assessed by trained interviewers (Andersen et al. 2017; Hodgson et al. 2018; Vaid and Evans 2017). Some studies also consider the presence of essential facilities within the household, including adequate heating in winter, adequate cooling in summer and having basic amenities such as a bath, shower, indoor toilet and running hot water (Bray et al. 2017; Cox et al. 2019; Curl et al. 2015). Regarding prevalence of quality issues, Clair et al. (2019) found that 10% of the European population live in housing of inadequate quality. Nolan and Winston (2011) examined age effects and uncovered that older adults, in particular, those over 65 years old, are more likely to experience housing quality problems compared to those younger.

The unsuitability of housing is explored in this thesis through overcrowded dwelling conditions, with the definition of this aspect varying across studies. Some studies just measure the number of persons in a household to a room, defining overcrowded as more than 2 per room (Andersen et al. 2017; Filali 2012). Navarro et al. (2010) described overcrowding as when a dwelling has an number of rooms less than the number of individuals within the household, although determining the space one desires can be viewed as a subjective matter. Regarding overcrowding in Indigenous Australian households, the main influences for this issue are seen to be the combination of homelessness, kinship obligations and unaffordable housing (Andersen et al. 2016). Participants in Andersen et al.'s (2016) study however stated clearly that their preference is to live near and not with their extended family, especially as available housing is not particularly suited to house multi-family households.

One of the most commonly used methods for measuring overcrowding is the Canadian National Occupancy Standard, used in studies such as Pierse et al. (2016) and Mallett et al. (2011). This standard calculates the number of bedrooms required in a household based on a few requirements. Couples can share a bedroom, children under 5 can share regardless of gender while those over 5 years old and under 18 would only share a bedroom with someone of the same sex. The number of bedrooms required being

compared to how many are present in the dwelling to determine the presence of overcrowding (Pierse et al. 2016; Mallett et al. 2011).

Severe overcrowding in Australia is defined as a form of homelessness by the Australian Bureau of Statistics (ABS). It occurs when a dwelling needs four or more extra bedrooms to accommodate those who normally reside there based on the previously mentioned CNOS. The ABS describes those suffering from 'severely' overcrowded conditions in their dwelling are considered to be homeless as they do not have control of, nor access to space. Individuals residing in these conditions are generally unable to pursue social relations, have personal living space, maintain privacy or have exclusive access to kitchen and bathroom facilities. It is expected that those with alternative accommodation options would have used them if they are living in these conditions. Sustained and severe overcrowding can put the safety and health of persons at risk (ABS 2012; ABS 2018a).

2.4.4 Insecure Neighbourhoods

Not only do home-related factors have an adverse effect on the health and wellbeing of individuals, but the neighbourhood surrounding them can play a role. According to Sanbonmatsu et al. (2012) for instance, the social environment (the environment created by those living within the neighbourhood) can affect one's outcomes. Relocating to a more affluent area can reduce exposure to violence, due to the safer social environment. This can in turn improve mental health, due to the lower likelihood of encountering violence or crime. This reduced change of crime can further positively affect the community, as those within the neighbourhood are more trusting of each other and might be more willing to work together and support each other. Moreover, residing in higher socioeconomic neighbourhoods can potentially offer residents improved access to community resources than if they were to live in a low socioeconomic area. This includes high quality schools, jobs and supermarkets.

Neighbourhood insecurity commonly stem from an individual's perception or concern regarding their neighbourhood conditions. These could include factors such as crime rate, drug use, safety, noise levels, pollution, litter, high rates of poverty, satisfaction with

maintenance of local greenery (grassy areas, open spaces, flowers, trees, bushes) and vandalism (Baker et al. 2017; Bond et al. 2012; Brenig and Proeger 2018). Another domain of neighbourhood insecurity that is explored in the literature is the social aspect or social relations of individuals with those around them in the neighbourhood (Eibich et al. 2016; Tay et al. 2004; Wilson et al. 2004).

When considering neighbourhoods that are funded by local tax revenues, more disadvantaged neighbourhoods generally suffer even further due to this. If an area has a higher proportion of households that are low-income, this subsequently results in lower available funds for public spending. This in turn leads to issues such as lower quality schools and overextended public services to name a few. Furthermore, these can contribute to reduced education and employment opportunities (Frescoln et al. 2017).

2.5 Conceptualising the Links between Housing Precariousness and Wellbeing

There are models and theories within the literature that attempt to conceptualise some of the links that exist between the different aspects of precarious housing and wellbeing. To understand wellbeing, Frescoln et al. (2017) argues that researchers must take into consideration not just the characteristics of the individual, but that of the family, home and neighbourhood. These are commonly referred to as the social determinants of health when combined.

There are some studies that have attempted to conceptualise how policies that aim to reduce housing precariousness can improve wellbeing. One example is the Moving to Opportunity (MTO)[1] program, which relocates participants from high-poverty neighbourhoods to low-poverty neighbourhoods. Sanbonmatsu et al. (2012) hypothesizes in figure 2.3 the way MTO may impact on an individual's outcomes. This diagram displays the multiple pathways in which changes to a person's environment ultimately affects their wellbeing. For instance, the goal of the MTO is that higher socio-economic status communities can potentially provide low-income families improved access to

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[1] Section 3.4 in chapter 3 explains the MTO in detail.

community resources. This includes greater opportunity for employment and better-quality healthcare.

Figure 2.3: How Relocation can Affect Wellbeing

Hypothesized Pathways Through Which MTO May Affect Adult Well-Being

| Use MTO Voucher or Certificate To Move |

Community/Housing Mediators

Social environment
- Safer neighborhoods with greater collective efficacy
- More neighbors who are college educated, are employed, exercise, and eat healthier

Community resources
- More employers
- More full-service banks
- More supermarkets and green grocers
- Fewer fast-food restaurants and liquor stores
- Better/worse healthcare access
- Fewer social service providers
- Less public transportation

Physical environment
- Better air quality
- More walkable neighborhoods and green space
- Higher quality housing
- Less indoor exposure to vermin, toxins, and mold

Individual/Family Mediators

Safety and stress
- Less stress
- Less exposure to violence

Health behaviors
- Healthier eating
- More exercise

Employment/finances
- More active job search
- Higher wages
- Greater use of formal banks
- More cognitive space for financial decisions

Social support/standing
- More/less isolation
- More/less support
- Increase in relative deprivation
- Disruption of social networks
- Better/worse job referral networks

Adult Well-Being

Physical health
- Self-rated health
- Diabetes
- Obesity
- Asthma
- Difficulty with daily activities

Mental health
- Psychological distress
- Major depression
- General anxiety
- Post-traumatic stress disorder
- Substance dependence

Economic self-sufficiency
- Earnings
- Employment
- Receipt of government assistance

Source: Diagram reproduced from Sanbonmatsu et al. (2012, 113)

2.6 Chapter Summary

This chapter describes the history, theory and measurement of subjective wellbeing in the economics and broader social science literature. The various housing precariousness dimensions of tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods are conceptualised. The chapter then highlights various conceptual models that have attempted to integrate the concepts of housing precariousness and subjective wellbeing. The ensuing chapter builds on the conceptual frameworks described

here by reviewing the international literature in greater detail. Together, the conceptual frameworks and literature review form the basis for empirically testing the links between housing precariousness and wellbeing in the rest of this thesis.

Chapter 3 – Literature Review

3.1 Scope of Literature Review

The focus of this literature review is to explore the effects of housing precariousness on the outcomes of Australian adults in terms of their health and satisfaction, or in other words, their subjective wellbeing. Studies that focused on children and their outcomes are excluded from this literature review as the thesis focuses specifically on the wellbeing of adults.

An extensive review of Australian studies is conducted. However, where possible, comparisons are made to studies from overseas. Hence, overall, this chapter reviews studies from all over the world. Most studies are drawn from Australia, the US, the UK and Canada, but efforts are made to also capture contributions of other countries. These include contributions from New Zealand, Spain, Germany, Cambodia, India, Thailand, Tunisia and the Republic of Ireland. It is notable that several studies explored multiple countries from Europe simultaneously, ranging from three to 34 different European countries within a single paper. The spread of countries that have conducted analysis on housing precariousness and wellbeing highlights the fact that the issue of housing precariousness is internationally prevalent and spans geographical boundaries. For instance, Clair et al. (2019) finds that over half the European population reported at least one form of housing precariousness, around 15% two forms and around 3%, three forms.

The international literature highlights four forms of housing precariousness that are potentially pervasive and important for wellbeing – tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods. Hence each form of precariousness is reviewed in turn in the following sections. Section 3.2 examines the literature concerning tenure insecurity and its links to wellbeing. As discussed in chapter 2, the concept of tenure insecurity can be contextualized within both the residential mobility context and housing precariousness context. Due to this, both sets of literature are reviewed in this section. Section 3.3 moves on to highlighting the literature surrounding unaffordable housing and wellbeing. Section 3.4 sets out the literature around unsuitable housing and wellbeing, while section 3.5 describes what has been found in relation to the impacts of insecure neighbourhoods on wellbeing. Section 3.6

then concludes the chapter by describing gaps identified in the knowledge base and the contributions this thesis makes by addressing some of these gaps.

3.2 Tenure Insecurity

The tenure insecurity aspect of precarious housing concerns how individuals do not have a sense of security in their dwelling. This can be due to various factors such as forced mobility, short lease lengths and residing in private rental markets that are lightly regulated such as in Australia. As explained in section 2.4.1, studies on the topic of insecure tenure span both the housing precariousness and residential mobility literature.

3.2.1 Tenure Insecurity in the Housing Precariousness Literature

Concerning those in the private rental market, short lease lengths can cause individuals to worry and feel anxious about future housing circumstances due to the uncertainty (Fitzpatrick and Watts 2017; Richardson et al. 2016; Ziersch et al. 2017).

Forced mobility is typically regarded in the literature as being disruptive; it increases the risk of financial hardship and homelessness for the vulnerable population, including low-income households, families with children, older people and those with a disability (Productivity Commission 2019). Mallett et al. (2011) also found evidence of gender effects, with men experiencing forced mobility more likely to be in poor mental health, but women appearing to be unaffected. A dominant theme in a study by Beer et al. (2011) is that tenure insecurity negatively affects an individual's psychological wellbeing, as being forced to move adds to depression and anxiety problems in addition to ruining social relationships made. Dunn (2002) highlighted that tenants who reported that they are worried about being forced to move from their dwelling have a significantly higher chance of reporting worse physical and mental health.

Looking at effects of different countries, in Australia, results from a study on refugees and asylum seekers found that families being forced to move from their dwelling reported high levels of stress trying to find suitable housing for the family with little notice

(Ziersch et al. 2017). Concerning the UK, the change from lifetime tenancies in social housing to fixed term tenancies has had detrimental effects to tenants' mental health, also significantly reducing housing security (Fitzpatrick and Watts 2017). In developing regions, forced land evictions of Cambodian families from their homes by the government has also been found to have an adverse effect on their mental health (Richardson et al. 2016).

3.2.2 Tenure Insecurity in the Residential Mobility Literature

Tenure insecurity in relation to residential mobility can be seen in both a positive and a negative light. Lardies-Bosque (2017) found a positive age effect, highlighting that residential mobility appears to benefit the quality of life and wellbeing levels of older individuals. The Moving to Opportunity (MTO) program based in the US also draws on the benefits residential mobility can have. Various studies have investigated this program, the general consensus being that low-income families exhibit improved wellbeing after being relocated from high-poverty neighbourhoods into the private rental market located in low-poverty neighbourhoods (Frescoln et al. 2017; Ludwig et al. 2013; Sanbonmatsu et al. 2012).

Not all is positive with residential mobility though. Commins (1978) as well as Johnson and Lichter (2019) have highlighted the impact that migration flows from regional urban areas have on declining rural, remote markets in addition to agricultural sector. Further to this, Henley (1998) and Whelan and Parkinson (2017) conclude that a lack of mobility can potentially impede the efficient functioning of labour markets.

According to Tunstall (2015), there is a higher prevalence of mental health problems amongst those who moved due to 'difficult life events'. This includes relationship breakdown, job loss or housing repossession. This supported Phinney's (2013) study, which found that individuals who move have a greater chance of reporting more mental health issues and lower levels of satisfaction with their home compared to those who have not moved (Phinney 2013).

Individuals dealing with deprivation and disadvantage usually have local networks of friendship and associations to help cope, thus, increased mobility disrupts this (Robinson and Walshaw 2014). Additionally, Oishi (2010) found that high levels of mobility have an adverse effect on social relationships, leading to a casual, but broad friendship network. Further to this, Oishi and Schimmack (2010) investigated the effect of mobility on personality types and uncovered that introverts experienced stronger adverse effect to social relationships compared to extraverts.

Gender effects are explored in Magdol's (2002) study, who concluded from their results that women had experienced greater levels of psychological distress than men in relation to residential mobility. Furthermore, mobile women suffered from higher levels of psychological distress compared to nonmobile women.

3.3 Unaffordable Housing

The unaffordable housing aspect of precarious housing can be described as when a household has high housing costs relative to their gross household income, as explained previously in section 2.4.2.

A multitude of studies have uncovered that unaffordable housing is a detriment to mental health and psychological distress. Few studies have investigated the relationship between unaffordable housing and physical health; the ones that did, found that physical health is not affected significantly by affordability issues (Bentley et al. 2016; Pierse et al. 2016; Singh et al. 2019). Beer et al. (2011) established that unaffordable housing negatively impacts wellbeing, with private renters reporting a lack of affordability as one of the most important housing issues to them.

Similarly, Bentley et al. (2011) and Bentley et al. (2016) found that moving from affordable to unaffordable housing causes mental health to decline. According to Bentley et al. (2011), lower income households (in the lowest 40% of income distribution) are more likely to move into unaffordable housing. At the same time, this group suffered greater declines to their mental health compared to higher income households who experienced little change to mental health if their housing became unaffordable. Moving

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onto gender effects, Bentley et al. (2012) observed males face greater decreases to their mental health as opposed to women when moving from affordable to unaffordable housing.

Comparing the role tenure has in influencing the relationship between affordability and health in Australia and the UK, the mental health of those in the UK are not as affected compared to those living in Australia (Bentley et al. 2016). Moreover, qualitative research done by Ziersch et al. (2017) on asylum seekers and refugees highlighted that cost of living and the high costs of renting in Australia are a key issue. This issue especially affected this group due to lower levels of financial assistance from the government as well as difficulty finding work, which is exacerbated by their poor English skills (Ziersch et al. 2017). Andersen et al. (2017) and Mallett et al. (2011) noted that individuals in government housing are less likely to report affordability problems compared to renters and homeowners with a mortgage, due to housing costs being capped relative to total household income.

Low-income individuals are restricted in the type of housing they can choose. For instance, Beer et al. (2011) and Ziersch et al. (2017) outlined in their respective studies that the only affordable housing choice available to those with a low-income is usually housing of poor quality. This in turn, further compounds the negative effects to health.

Expanding on the housing first model discussion in section 1.4.4, there are generally support programs available to assist those once they become homeless (AIHW 2020). A broader approach to improve health and wellbeing outcomes though is to ensure there is an adequate supply of affordable housing in the first place to prevent people becoming homeless (Bentley et al. 2011; Ong ViforJ and Leishman 2020). This is an issue in Australia however as there is a declining supply of affordable and social housing relative to population growth (Ong ViforJ and Leishman 2020).

3.4 Unsuitable Housing

The unsuitable housing domain of precarious housing as described in section 2.4.3 previously, generally refers to housing issues related to the condition of the house, in addition to overcrowding problems.

In general, housing quality issues such as mould, coldness, structural problems and overall poor-quality housing negatively impacts on individuals' physical and mental health (Baker et al. 2016; Jones-Rounds et al. 2014; Ziersch et al. 2017). There are several articles that have highlighted the positive link between housing that is in good condition and good health, as well as showed how an improvement to housing conditions and quality can benefit the wellbeing of individuals (Bray et al. 2017; Curl et al. 2015; Egan et al. 2013). Barton et al. (2007) and Bray et al. (2017) found that improvements to heating is beneficial to one's health whereas Bonnefoy et al. (2003) concluded from their study that eliminating noise problems would alleviate detriment to health and wellbeing. According to Curl et al. (2015), fabric works such as insulation and roof covering, kitchen and bathroom works in addition to improvements to the dwelling's front door all have positive impacts to mental health.

The issue of overcrowding refers to having too many individuals within a household compared to the amount of space available, as defined in section 2.4.3. Various studies have found that improvements in overcrowding can positively influence wellbeing, with overcrowding issues being associated with worse wellbeing outcomes (Foye 2017; Johnson 2005; Navarro et al. 2010). Furthermore, Pierse et al. (2016) and Wells and Harris (2007) concluded that changes to severe overcrowding can play a major role in reducing psychological distress. According to Guite et al. (2006), overcrowding can predict poor mental health while Johnson (2005) took this further, finding that issues overcrowding can magnify other mental health issues.

Living space is theorised to be positively related to subjective wellbeing by Foye (2017). For instance, it could represent an increase in freedom. Increased space means that one can have friends over, ability to sit in peace and quiet and eat as a family. These activities are restricted when there is a lack of space. Therefore, by allowing these activities to be facilitated, you could expect wellbeing to improve. There is a diminishing marginal effect

though with increased space however, having too much excess space can actually be a detriment to wellbeing.

3.5 Insecure Neighbourhoods

The insecure neighbourhood domain of housing precariousness concerns how neighbourhood related factors impacts on the wellbeing of individuals, as explained in section 2.4.4.

An individual's perception of social neighbourhood characteristics such as crime and safety, as well as physical neighbourhood characteristics such as noise and pollution, is discovered by Wilson et al. (2004) to be a key determinant of health. In particular, individuals who like physical aspects of their neighbourhood were less likely to report poor self-reported health and emotional distress compared to those who did not like anything physically. Those who are dissatisfied with their neighbourhood also appeared to experience higher levels of emotional distress compared to those who are satisfied (Wilson et al. 2004). Moreover, Eibich et al (2016) found that social cohesion in the neighbourhood, such as neighbours being friendly with each other, leads to better life satisfaction and mental health levels.

Some studies focus on vulnerable groups. Asylum seekers and refugees new to Australia reported that factors within the social environment of their neighbourhood including safety, presence of friendly and respectful neighbours in addition to public transport access are all important influences to their housing experience and overall health (Ziersch et al. 2017). Findings from a study done in India found that women in slum housing have stronger neighbourhood social ties than women living in public housing (Vaid and Evans 2017).

In the United States, the MTO program, which moves low-income families in public housing from high-poverty neighbourhoods into low-poverty neighbourhoods, has been analysed in various studies. Multiple studies have shed light on the improvements to physical and mental health outcomes the MTO program has. This includes reduced psychological distress, reduced diabetes and reduced obesity via lower Body Mass Index

scores 10 to 15 years onwards (Comey et al. 2012; Ludwig et al. 2013; Sanbonmatsu et al. 2012). Further to this, Frescoln et al. (2017) found that being relocated to neighbourhoods perceived as safe improves one's wellbeing and quality of life. Moving from high-poverty neighbourhoods to low-poverty neighbourhoods as a result of the MTO program appears to result in substantial long-term improvements to physical and mental health (Ludwig et al. 2012; Ludwig et al. 2013; Sanbonmatsu et al. 2012).

3.6 Gaps in the Literature and Thesis Contribution

Based on the critical literature review done, there are several gaps identified for further research within this thesis. These have been detailed in the introductory chapter of the thesis and are re-summarised here.

There is extensive literature on the impact of tenure insecurity on children development. However, the relationship between residential mobility in adults and wellbeing is less extensive. Furthermore, another gap evident is that most studies only explore one or two forms of tenure insecurity such as evictions or moving due to difficult life events (Desmond and Kimbro 2015; Tunstall et al. 2015). This thesis addresses this gap by comparing two aspects of tenure insecurity with four other forms of residential mobility in chapter 5.

Housing precariousness appears to be commonly defined by three different aspects in the literature either combined or by themselves - unaffordable housing, unsuitable housing and tenure insecurity (Beer et al. 2016; Clair et al. 2019; Ziersch et al. 2017). Thus, a possible gap in the knowledge base is to investigate the aspect of insecure neighbourhoods alongside the previously mentioned housing specific aspects, which this thesis does in chapter 6.

To date, only one study has been found to quantitatively analyse tenure insecurity, unsuitable housing, unaffordable housing and insecure neighbourhoods combined. This study is not nationally representative, with the data gathered from around 1,000 low-to-middle income South Australian households only (Baker et al. 2017).

There are a few studies within the literature that have investigated the relationship between housing precariousness and wellbeing in both directions, analysing whether precarious problems negatively affect health or that those with poor health are more likely to report housing issues. The bi-directional analysis by Baker et al. (2014) only investigates unaffordable housing while Mallet et al (2011) covers data from a shorter time period and doesn't analyse satisfaction as an aspect of wellbeing. This thesis provides a more comprehensive analysis on this bi-directional relationship between a wide range of wellbeing outcomes and precarious housing factors, also covering a larger time period.

This thesis also fills another gap in the literature in chapter 7, by deriving a nationally representative housing precariousness index covering four forms of precarious housing – unaffordable housing, unsuitable housing, insecure housing and insecure neighbourhoods. To my knowledge, no study has attempted this. Baker et al. (2017) include all four forms of precariousness in their index, but their index is not nationally representative as they rely on a relatively small South Australian sample, with the data also only being from a single year (2013).

Moreover, to the best of my knowledge, no study has generated a comprehensive wellbeing index that combines SF-36 health outcomes and life satisfaction measures into the one index. This thesis addresses these gaps by deriving a wellbeing index involving both SF-36 outcomes and life satisfaction in chapter 7.

In general, the evidence on the links between housing precariousness and wellbeing presented in this thesis will be the most up-to-date among all existing Australian studies, spanning a timeframe of 2001 – 2018. This thesis also investigates a more comprehensive range of wellbeing outcomes than existing studies. A wide range of nine wellbeing domains are covered, including life satisfaction, mental and emotional wellbeing, physical wellbeing and social wellbeing.

Having established the contributions that the thesis makes to the literature, the following chapter sets out the thesis methodology designed to operationalize these contributions. The chapter then describes the dataset used, the sample generated, the key variables constructed as well as the different model techniques and specifications to be deployed.

Chapter 4 – Data, Variables and Modelling Strategy

4.1 Introduction

The objective of chapter 4 is to set out the wide range of empirical methodologies that are deployed throughout the whole thesis. Section 4.2 describes the Household, Income and Labour Dynamics in Australia (HILDA) survey, the dataset of choice for this thesis and the thesis sample design. Section 4.3 defines the four different measures of housing precariousness employed to measure the impact they have on the wellbeing of Australian adults. They consist of tenure insecurity, unsuitable housing, unaffordable housing and insecure neighbourhoods. The first three domains are frequently used in combination within the literature to measure housing precariousness, while the neighbourhood insecurity is included as an additional factor in this thesis due to these four aspects not been previously quantitatively analysed together. Section 4.4 describes the measurement of the wellbeing outcomes in the HILDA survey.

Section 4.5 outlines the various control variables that are employed throughout this thesis. Section 4.6 describes the Ordinary Least Squares (OLS) regression technique, which is used throughout this thesis while section 4.7 describes the logistic regression technique executed as part of the second key research question. This is followed by section 4.8 which explains the panel data estimators and associated tests used. Section 4.9 sets out the PCA methodology and section 4.10 the factor analysis method used to address the third research question. Section 4.11 then concludes with a chapter summary.

4.2 Dataset – HILDA Survey and Sample

The HILDA survey is a longitudinal study that tracks a nationally representative sample of individuals and household over time. This survey has been collecting data annually beginning in 2001 up until the latest release of the 2018 data. Households are selected for the HILDA study using a multistage approach. There were 488 census collection districts selected from across Australia. Within each of these districts, approximately 22 – 34 dwellings were selected and, in each dwelling, up to 3 households were chosen. Information is then collected from household members aged 15 years and older via

interviews conducted by trained interviewers and self-completed questionnaires. All the observations are categorised in waves, with each wave representing a specific year. Wave 1 refers to data collected in 2001 while wave 18 refers to the year 2018 (Melbourne Institute n.d.).

The HILDA survey is a form of panel data or longitudinal data, which can be described as when a group of individuals are surveyed repeatedly over a period time. Panel data is also described as longitudinal data in some studies (Frees 2004; Melbourne Institute n.d.). This form of data allows for changes to an individual's behaviour to be tracked across a certain period of time. Therefore, the impact that different factors can have on these individuals as they age can be analysed (Frees 2004; Singer and Willett 2003).

There are two key advantages with panel data when compared to time series and cross-section data. The first is the ability to analyse dynamic relationships. The second is the ability to model within person differences over time. One disadvantage associated with panel data is that it can be more complex to manage than time series or cross-sectional data. Another issue is attrition, which can be described as a gradual erosion of responses by participants. This can lead to biases in results derived from the data if the attrition is non-random (Frees 2004).

The HILDA survey is particularly suitable for the purposes of this thesis for various reasons. The HILDA survey contains critical housing precariousness and wellbeing data that enables population wide conclusions to be drawn. The dataset provides a thorough set of individual and household data that covers a range of themes. Information related to an individual's precarious housing circumstances such as tenure status, reasons for moving, income spent on housing costs and amount of people living in the one household relative to the amount of rooms are all important. This survey allows for the design and measurement of a range of precarious housing indicators, which are key to the three major pieces of analysis conducted throughout this thesis. Other important information from the HILDA survey includes wellbeing outcomes and neighbourhood related factors.

The sample framing begins with selecting individuals who were interviewed either face-to-face or over the phone. The waves of observations were then stacked into a person-period dataset, with each person in the dataset possessing multiple records, having one

for each time period they are observed in. The number of person-period cases available for empirical analysis to address each of the key research questions amounts to over 200,000 observations pooled from waves 1 – 18. In a small number of instances, the observations necessarily drop where the key variables are not available in every wave. For instance, psychological distress – a key wellbeing outcome – only has 70,710 observations because it is only available in every second wave after wave 7. In general, there are 8,678 to 13,891 person-period observations available in each wave, with there being around 9,000 – 10,000 person-period observations in waves 1 – 10, while waves 11 – 18 contain a higher amount of person-period observations ranging from 12,000 to 13,000.

4.3 Precarious Housing Measures

The following sections describe the four different precarious housing measures employed for this thesis.

4.3.1 Tenure Insecurity

Tenure insecurity is observed via forced moves. A person is classified as experiencing housing-related forced mobility or forced moves if they recorded having changed address since their last interview and also answered yes to one of three questions that asked their main reason for moving. These three questions related to whether they were evicted, in government housing and had no choice, or the property became no longer available. Those who could not pay their mortgage or rent on time in the last year and had changed address since last interview are also classified as having experienced a forced move.

A key contribution of the first research question is that tenure insecurity is explored not just as a form of housing precariousness, but also as a negative form of residential mobility. Hence, tenure insecurity is compared with four other forms of residential mobility in chapter 5 to address this research question. As the tenure insecurity variables relate more so to involuntary housing-related mobility, it is firstly compared to voluntary

housing-related mobility. This is categorised by reasons for moving that reflect the participants' own choice. Specifically, if an individual answered yes to one of these six main reasons for moving: to be closer to amenities and services or public transport, to live in a better neighbourhood, a housing or neighbourhood reason, to get a larger and/or better place, to get a place of their own, and lastly, to get a smaller and/or less expensive place.

Secondly, tenure insecurity, a form of involuntary housing-related mobility, can also be compared to mobility that is not housing related at all. This variable captures reasons for moving including: to be closer to friends and/or family, to follow a spouse or parent/whole family moved, and to look for work or relocate the business.

Thirdly, anticipated residential mobility is derived from a question in the HILDA Survey which asks whether an individual expects to move house in the next 12 months. This could be driven by either positive or negative reasons. An individual could have wanted to move voluntarily rather than being expected to be forced out. It is still insightful however to examine whether anticipation of a move is likely to have a disruptive effect on wellbeing.

Fourthly, a respondent's attachment to place is a form of residential immobility. The variable derived is a continuous variable that calculates a rate using the following formula:

$$\alpha = (\beta \div age)^* 100$$

Here α is the attachment to place rate, β represents a participant's duration at the current address which divided by the survey respondent's age. The result is multiplied by 100 to transform the result into a percentage.

Table 4.1 below presents the frequencies of the various tenure insecurity and residential mobility indicators within the person-period sample. Private renters are the largest group making up 24.3% of the sample, while housing-related forced mobility makes up the smallest group at 2.8%. The groups are not mutually exclusive, that is, a person could experience more than one form of insecurity or mobility at the same time.

Table 4.1: Frequencies of Tenure Insecurity and Other Residential Mobility Indicators

Tenure Insecurity/Mobility Indicator	Percentage of Sample Size	Count of Sample Size
Housing-Related Forced Mobility (forced moves)	2.8% (5541)	5,541
Housing-Related Voluntary Mobility	7.9% (15,828)	15,828
Non-Housing-Related Mobility	9.5% (19,104)	19,104
Anticipated Residential Mobility	15.2% (30,668)	30,668
Attachment to Place (>50%)	9.6% (19,219)	19,219

Source: Own calculations from the 2001 – 2018 HILDA Survey

4.3.2 Unaffordable Housing

To measure unaffordable housing, the '30/40' rule is applied. As explained in chapter 3, a person is in housing stress when the person's household spends greater than 30% of their income on housing costs and their equivalised household income is in the lowest 40% of the income distribution. The low-income threshold of 40% of equivalised income for every year from 2001 to 2018 are listed in table 5.1, which are all expressed in real values at the 2018 price level. There is a sharp upward trend of the low-income threshold up until 2009, starting at around $31,000 in 2001 to peaking at around $42,000 about the time of the GFC. From this point until 2018, the low-income threshold remains relatively unchanged before settling at around $40,000 in 2018. This could potentially be due to a stagnation in wage growth.

The purpose of using equivalence scales is to adjust household income to provide a better indication of the economic resources available to the household based on the size and composition (ABS 2016b). An example is that a single person in a household would have more resources or income available to them than a family with kids, assuming the two household types have the same unequivalised income level (ABS 2016b). Equivalised household income is generated by dividing the unequivalised income of each person's household by a factor that is drawn from the OECD modified equivalence scale. According to the OECD modified equivalence scale, the first adult is allocated 1 point, with a further 0.5 points allocated for every additional individual aged 15 years or older, and 0.3 for each child under 15 years old (ABS 2016b).

Table 4.2: Low-Income Threshold Based on Equivalised Household Income, 2001 – 2018, Real Dollars at the 2018 Price Level

Year (Wave)	Low-Income Threshold (40% of National Income)
2001	$31,044
2002	$31,819
2003	$32,399
2004	$33,318
2005	$34,599
2006	$36,178
2007	$38,137
2008	$38,695
2009	$42,025
2010	$40,715
2011	$39,642
2012	$41,211
2013	$41,302
2014	$40,827
2015	$41,485
2016	$41,709
2017	$41,366
2018	$40,030

Source: Own calculations from the 2001 – 2018 HILDA Survey, ABS 2020, ABS 2016b.

4.3.3 Unsuitable Housing

In order to measure unsuitable housing, one variable is chosen – overcrowded households. There are other options available in the HILDA survey such as external dwelling condition and dwelling security, these are excluded however due to very low numbers of observations. For instance, dwelling condition is only available in the first five waves and wave 11.

Individuals are classified as living in overcrowded conditions if the number of bedrooms in their dwelling is less than those specified in the Canadian National Occupancy Standard (CNOS) (ABS 2016a; Mallett et al. 2011). The CNOS standard states that:

- There should not be more than two people per bedroom.
- Children under 5 years old of different gender can share a bedroom.
- Children 5 years and older of opposite gender should have separate bedrooms.
- Children under 18 years of age and the same gender can share a bedroom.

- Single adults 18 years and older should have separate bedrooms, as well as any coupled adults 18 years and older and parents (ABS 2016a; Mallett et al. 2011).

The CNOS is chosen due to it being a widely used measure for overcrowding both internationally and within Australia (ABS 2016a). This method was developed back in the 1980s by the Canada Mortgage and Housing Corporation as a detailed way of measuring overcrowding compared to other international standards by incorporating age, sex and the relationship of those within the household (Statistics Canada 2019). As detailed in chapter 3's literature review, overcrowding is potentially linked with poorer wellbeing outcomes.

4.3.4 Insecure Neighbourhoods

The effect of insecure neighbourhoods is included as a key aspect of housing precariousness within this thesis to fill a gap in the literature as limited studies having compared it to the other three forms of precariousness. To measure this aspect, a Socio-Economic Indexes for Areas (SEIFA) index is chosen in addition to two variables representing neighbourhood crime and hostility. As highlighted in chapter 3, these have been referred to in numerous studies in the housing literature as forms of neighbourhood insecurity.

There are several different SEIFA indices available for analysis from the HILDA Survey. The index of relative socioeconomic advantage/disadvantage is chosen as it provides a more broad-based measure of neighbourhood precariousness than the other SEIFA indexes. The index of relative socio-economic advantage/disadvantage is a continuum of advantage to disadvantage, which takes into consideration factors such as proportion of families with high income, those with tertiary education and those employed in skilled occupations. It is derived from economic and social census information, with a lower score in this index representing a more disadvantaged area while a higher score represents a more advantaged area. This SEIFA index has a score range of 445.2 to 1222.9 (ABS 2018b).

The neighbourhood crime and hostility variables are scored from 1 to 5 for this analysis, with a 1 indicating it never happens and a 5 indicating it is very common. Within the descriptive analysis, a score of 4 or 5 is used to indicate a respondent experiencing housing precariousness in these two areas. The SEIFA index is available in every wave while the crime and hostility neighbourhood variables are only available in waves 1 to 4, and then every two waves from wave 4 onwards. To address these data gaps, a missing observation in a wave is replaced with its value for the same respondent from the previous wave.

4.4 Wellbeing Outcomes

There are nine different subjective wellbeing measures drawn from the HILDA survey in order to measure a person's overall wellbeing across all three parts of the thesis. All these wellbeing outcomes are grouped into four domains addressing different facets of wellbeing:

(i) *Satisfaction* – Satisfaction with home, community and finance.

(ii) *Mental-emotional* – Mental health, psychological distress and role-emotional measures.

(iii) *Physical* – Vitality and role-physical measures.

(iv) *Social* – Social functioning measure.

4.4.1 Satisfaction Variables

There are 10 different questions within the HILDA Survey that record an individual's self-evaluation of their satisfaction. These include satisfaction with life, feeling part of the community, employment opportunities, amount of free time, financial situation, home you live in, how safe you feel, health, neighbourhood you live in and job satisfaction. Each of these questions are scored on a scale from $0 - 10$, with 0 representing totally dissatisfied, 5 neither satisfied nor dissatisfied and 10 totally satisfied. Three satisfaction

questions are drawn from the possible 10 for the purposes of this thesis – satisfaction with home, finance and community. The other satisfaction measures are experimented with, but there is not much variation in scoring between those who experienced precarious housing and those who did not, so they are excluded from the analysis.

4.4.2 SF-36 Variables

The SF-36 measure within the HILDA survey is employed as another method of measuring respondent's wellbeing for the purposes of this thesis, which is explained earlier in chapter 2. Some of the question's respondents are asked include have you felt so down in the dumps nothing could cheer you up, have your physical and emotional problems interfered with social activities as well as do you feel worn out. This thesis draws on the mental health, vitality, social functioning, role-emotional and role-physical variables. The other SF-36 measures are experimented with, but are excluded due to limited variation in scoring with those experiencing precarious housing compared to those who are not. As described in chapter 2, these measures are scored from $0 - 100$, with higher scores indicating better levels of wellbeing (Ware 2000). These variables are available in each wave of HILDA, with no population group excluded from being asked these questions.

4.4.3 Kessler 10 Psychological Distress Scale

The K10 scale from the HILDA survey is used as an additional indicator of health, which is explained in detail earlier in chapter 2. The overall scoring ranges from $10 - 50$, with the higher the score, the higher the levels of psychological distress and thus, lower levels of wellbeing. This measure is present in every second wave starting from wave 7, with no population group being excluded from being asked this question.

4.5 Control Variables

This section outlines the different control variable predictors that are entered into the regression models throughout all three parts of the thesis. These are used to differentiate the effect of housing precariousness from potentially confounding influences which are captured by these other predictors.

4.5.1 Tenure Type

The tenure type indicator is used to categorise the tenure the participant resides in, with their being five different domains. There are private renters, public renters, homeowners with a mortgage, homeowners that are outright owners and lastly, other tenures such as rent-free persons. A respondent falls under the private renter classification when they rent from any landlord other than the government, while public renters are then those who rent from a government housing authority.

4.5.2 Sociodemographic Characteristics

Various sociodemographic variables are used as controls for this analysis, which includes factors such as marital status, age, gender, presence of dependent children and having a long-term health condition.

Marital status is classified into legally married, de facto relationship, separated, divorced, widowed and single never married. To categorise age, individuals are asked what their age is as of June the year the survey is done. Within this analysis, the ages are then broken down into the following brackets – 15 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64 and then 65 and older. Regarding gender, respondents are categorised as either male or female. With children, respondents are categorised into having either no dependent children or at least one dependent child in the household aged between 0 and 24. Lastly, there is an indicator for whether someone in the household has a long-term health condition, disability or impairment or there is no long-term condition present. Due to

fixed effects estimators being deployed, the gender indicator is dropped from all the regression models and solely used as an interaction term in the interaction model.

4.5.3 Human Capital

There are two variables used to classify a respondent's level of human capital within this analysis – level of education and labour force status. Respondents are asked to indicate their highest level of education out of the following categories: postgraduate, graduate diploma, graduate certificate, undergraduate (bachelor or honours), advanced diploma, diploma, certificate 3 or 4, year 12 as well as year 11 and below. Regarding labour force, respondents report if they are either employed full-time, part-time, unemployed or not in the labour force.

4.5.4 Geographical Characteristics

In order to categorise respondents into different geographical areas, two variables are used. The first one sorts respondents based on their major statistical region, with the major states being split into the capital city and the rest of the state. The different categories include Sydney, balance of New South Wales (NSW), Melbourne, balance of Victoria, Brisbane, balance of Queensland, Adelaide, balance of South Australia (SA), Perth, balance of Western Australia (WA), Tasmania, the Northern Territory and the Australian Capital Territory (ACT). The analysis performed in chapter 5 includes the SEIFA decile of index of relative socio-economic advantage/disadvantage as a control variable, which is split into 10 different deciles.

4.5.5 Calendar Year

Lastly, variables are included that controlled for time effects, with each wave of the HILDA survey representing a certain calendar year. Wave 1 indicates data that is collected in 2001, wave 2 is gathered in 2002 which continues until wave 18 which represents data from 2018. The purpose of these is to capture the different housing market

cycles, for example, during the early 2000s, Australia saw a booming housing market but then saw a slump during the GFC around 2008.

4.6 Ordinary Least Squares

Ordinary Least Squares (OLS) regression can be described as an estimation technique for linear regression models that aims to fit a line or model of 'best' fit. In most cases, this is achieved by least squares method which minimises the sum of the squared errors – the difference between actual and modelled values. There are two types of estimators that are applied to OLS models with panel data – fixed effects and random effects, which are explained further on in this chapter (Brooks 2014).

4.7 Logistic Regression

Logistic regression, otherwise known as a logit model, is a nonlinear form of statistical analysis. This model is required when the dependent variable is not continuous but instead a binary variable. This model can be estimated using maximum likelihood estimation (MLE). The logit model takes the following form:

$$P_i = \frac{1}{1+e^{-(\beta_1+\beta_2 x_{2i}+\cdots+\beta_k x_{ki}+u_i)}} \tag{4}$$

Where P_i represents the probability, β_k the regression coefficients, x_k represents the explanatory variables and u_i the error term (Brooks 2014). The estimated probability can be used to derive odds, which Singer and Willett (2003) describe as comparing the relative magnitude of two complementary probabilities – the chance that a particular event will happen and the chance that it will not happen. Odds are calculated using the following formula:

$$odds = \frac{probability}{1-probability} \tag{5}$$

An example is that if the probability the event is going to occur is 0.5, then the chance that it will not happen is also 0.5. Further to this, odds can be converted into odds ratios (OR) to provide an easier method of interpreting the results. Using the private renter

outcome and single, not married control variables as an example, with both being coded as binary (0, 1). OR is the odds of the respondent classifying as a private renter when they are single not married, relative to the odds of the event occurring if the respondent is married, the reference group. An OR greater than one indicates a relatively higher chance while less than one indicates a lower chance. If the OR is two, then those single and not married are twice as likely to be a private renter. When analysing continuous predictors such as the satisfaction variables, the OR indicates the likelihood of the respondent being a private renter for every one point increase in satisfaction score (Singer and Willett 2003; Wood and Ong 2009). In chapter 6 where a logit model is deployed, the odds ratios for the models that have binary outcomes are calculated by taking the exponent of the coefficient that is generated. This is otherwise known as a 'log odds' transformation (Brooks 2014; Wood and Ong 2009).

4.8 Panel Data Estimators

The following sections describe the different estimators that are deployed for the OLS and logistic regression model and the related tests.

4.8.1 Fixed Effects Estimator

The purpose of the fixed-effects estimator is to remove the bias or unobserved heterogeneity associated with differences between individuals that are either not measured, or are difficult to measure but constant over time (Baker et al. 2012; Bentley et al. 2011; Bentley et al. 2016). Nonrandom quantities or fixed parameters are utilised to account for this heterogeneity (Frees 2004). The factors that are omitted from the model include personality characteristics, ethnicity and gender in order to provide an estimate that is not confounded by these differences between persons that cannot be accounted for in the model (Bentley et al. 2011; Bentley et al. 2016). The fixed effects model is employed throughout the whole thesis, in order to estimate wellbeing changes over time by only making comparisons within individuals (Baker et al. 2012; Bentley et al. 2011; Bentley et al. 2016).

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Researchers commonly deploy fixed effects estimators over random effects when analysing changes in subjective wellbeing (Bentley et al. 2011; Bentley et al. 2016; Boyce 2010). By viewing the same individual at different points in time, this allows researchers to control for heterogenous factors such as personality characteristics and fixing them over time without having to observe them, which results in potential bias being minimised (Boyce 2010; Kendall et al. 2018). Furthermore, this allows for stronger causal inferences to be made by investigating changes within individuals only. The model provides estimates of associations that will not be confounded by differences between individuals that are not accounted for in the model (Bentley et al. 2011; Bentley et al. 2016).

4.8.2 Random Effects Estimator

The objective of the random effect's estimator is to estimate both within and between individual differences in the chosen outcome variable over time. For example, the satisfaction and SF-36 health outcomes that are used in this thesis. This model specification allows for individual effects, with persons being simultaneously compared with each other. The model can also control for different potential compositional factors, but there is still a chance that unmeasured heterogeneity will explain the differences in wellbeing across the different groups (Baker et al. 2012). Compared to fixed effects, the random effects estimator uses random quantities instead of fixed parameters to model the heterogeneity (Frees 2004).

4.8.3 Breusch-Pagan Lagrange Multiplier Test

The Breusch-Pagan Lagrange Multiplier test is used to compare a panel data random effects regression specification to pooled regression specification. It tests if heteroskedasticity is present in a linear regression model, analysing whether the variance of the errors from the regression are dependent on the values from independent variables. The null hypothesis for this test is that this variance is equal to zero, which indicates that there is no panel effect detected and a pooled regression is more suitable, while random

effects is selected when it is rejected at the 5% significance level (Breusch and Pagan 1980).

4.8.4 Hausman Test

In order to determine whether a fixed effects or random effects estimator is more appropriate, a Hausman test is conducted. This test compares the two estimators and determines which one will provide more consistent estimates. The Hausman test can be described as a statistical test that checks for model misspecification when analysing panel data and provides assistance in choosing whether to utilise a fixed effects or random effects model. It achieves this by testing whether there is any correlation between the unique errors and regressors within the model. The null hypothesis for this test is that there is no correlation between the errors and the regressors, which indicates that a random effects model is preferred, while fixed effects is selected if it is rejected at the 5% significance level (Hausman 1978).

The Hausman test and fixed effects models have their limitations. Some researchers regard this test as insufficient as a sole indication of which model to choose. They suggest that model selection should consider the nature of the research questions. Nonetheless, the Hausman test is still a suitable and common tool for model selection, it is known to be conservative with fixed effect estimators still consistent regardless of whether the null hypothesis is true or not. Furthermore, there exists a significant pool of studies in the wider international literature that have used fixed effects estimators to model wellbeing outcomes. These include Baker et al. (2012), Bentley et al. (2011), Bentley et al. (2016), Desmond and Kimbro (2015) and Ong et al. (2018) to name a few. Fixed effects models are particularly suited to addressing the wellbeing research aims of these studies and this thesis, as it controls for person-specific unobservable characteristics and so it minimises this potential bias to the extent that unobservables such as personality type are fixed over time. Based on these aforementioned reasons, fixed effects modelling for this thesis is a reasonable and safe choice.

4.9 Principal Component Analysis

The method used to construct both the precarious housing index as well as the wellbeing index is known as the Principal Component Analysis (PCA). This analysis is commonly used as a dimensionality reduction technique. This technique is used in situations where there is a number of closely related variables and the researcher wants to allow the most significant influences from these variables remain after the index is constructed. PCA is a technique that is useful in situations when the variables are related – if there are k variables, then the PCA will transform these into a reduced amount of p new uncorrelated variables (Brooks 2014). This is useful as the private renter and forced move aspects of tenure insecurity could be combined as they are measuring a similar outcome, as well as the neighbourhood crime, hostility and area disadvantage variables. Regarding the wellbeing index, the mental health, psychological distress and role-emotional SF-36 variables used throughout this thesis could be seen as measuring similar outcomes as well as the vitality and role-physical variables.

The first step of the PCA procedure estimates the correlation matrix of all the included variables, with the eigenvalues and eigenvectors of this matrix being calculated next. The number of eigenvalues is equal to the number of columns in the correlation (square) matrix. These eigenvalues correspond to the variance of each principal component. Each eigenvalue has a corresponding eigenvector that can be generated.

Given the PCA results, only the first few principal components are selected based on their ability to explain a high proportion of the total variance. This is not always the case. Sometimes the first few components capture only a low proportion of the total variance. There are a couple of methods available to assist in making the decision on how many components to retain. One common method of determining the number of principal components to retain, is to select all components which have a variance or eigenvalue of one or greater, otherwise known as the Kaiser rule (Bartholomew 2010; Kaufman and Dunlap 2000). This is presented as a scree plot in figure 4.1, which displays the eigenvalues from a PCA in graph form. Based on the Kaiser rule, only the first two components would be chosen as they are the only ones with eigenvalues greater than or equal to one. This Kaiser rule is a simple, widely used method, with the reasoning for its

use being that it is not reasonable to keep factors that explain less variance than a single variable (Kaufman and Dunlap 2000).

Another method is to examine the scree plot and select the components up until the plot starts to 'flatten out', which indicates that additional components are explaining less and less of the overall variance (Bartholomew 2010; Kaufman and Dunlap 2000). As an example, looking at figure 4.1 below, the scree plot 'flattens' out after component 3, thus, the first 3 components would be selected for inclusion in this index. One weakness of this method is that it can be a subjective decision which could vary between different researchers (Kaufman and Dunlap 2000). Moreover, there are no absolute rules for deciding on how many components to retain, this is left up to the individual researcher (Bartholomew 2010; Kaufman and Dunlap 2000).

Figure 4.1: Scree Plot of Eigenvalues from Wellbeing Index
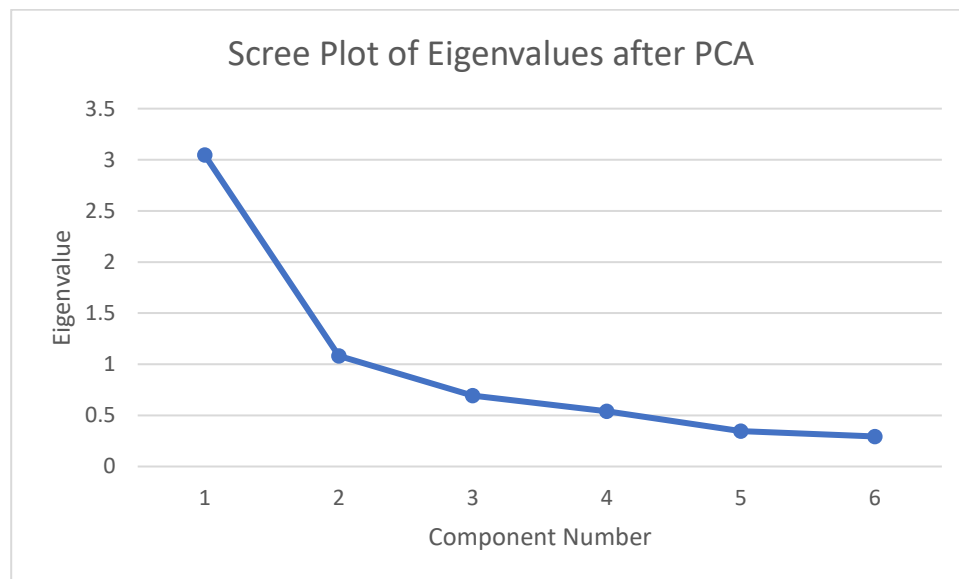
Note: these are the eigenvalues before the varimax rotation is performed
Source: Own calculations from the 2001 – 2018 HILDA Survey

Factor rotation methods can be applied to enhance the results of the PCA. These methods further transform the estimated components into new, simpler versions that are easier to interpret. This can be seen as an important step in the modelling process. Varimax rotation is one of these methods that is be employed in this thesis. For instance, table 7.6 further

on in this thesis presents the wellbeing index components after the PCA is conducted. Each of the seven wellbeing variables included are unique to 1 of the 4 components after a varimax rotation is performed, whereas before the rotation, the variables were appearing in multiple components (Manly and Navarro Alberto 2016).

4.10 Factor Analysis

Factor analysis is defined by Bandalos and Finney (2010) and Mueller and Hancock (2015) as a method of modelling the covariation of a set of observable variables as a function of a latent construct. The term construct refers to a theoretically defensible, but unobservable concept, such as creativity, intelligence or wellbeing, with the constructs being latent as they are not directly observable or measurable (Bandalos and Finney 2010; Borsboom et al. 2003; Mueller and Hancock 2015). Thus, the purpose of factor analysis is to provide researchers a way of identifying and better understanding the latent constructs underlying the chosen measured variables. Comparing factor analysis to principal component analysis, the former analyses shared variance while the latter considers all of the variance (Bandalos and Finney 2010).

Two broad categories of factor analysis are described in this section – exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA, the method that is deployed for this thesis, is often used as the first step when researchers generate scales such as via PCA, before they move onto a CFA.

EFA can be described as a variable reduction technique that aims to identify the latent constructs or hypothesize their possible structure for a set of observed variables. For the purposes of this thesis, the separate precarious housing and wellbeing indicators are examined to analyse the amount of variance they explain in the latent constructs of precarious housing and wellbeing respectively (Bandalos and Finney 2010; Suhr 2006).

CFA then allows researchers to evaluate and provide a better understanding of the hypothesized structure of these latent constructs, examining if the data fits to the theory driven model being measured. This ensures that items only load onto the factors they were designed to measure, providing a check that a relationship exists between the

observed and latent variables (Bandalos and Finney 2010; Gallagher and Brown 2013; Mueller and Hancock 2015; Suhr 2006).

4.11 Chapter Summary

This chapter has described the range of different methodologies that are employed throughout this thesis. This includes the dataset and sample used, the range of different variables deployed as well as the various statistical techniques utilised. The next chapter sets out the first major piece of analysis of this thesis, addressing the first key research question. Uncovering the effect of tenure insecurity on the wellbeing of Australian adults, and whether this impact differs by different sociodemographic groups.

Chapter 5 – The Effect of Tenure Insecurity on Wellbeing

5.1 Introduction

Chapter 5 of this thesis addresses the first research question as follows:

How does tenure insecurity affect the wellbeing of Australian adults and does this effect differ by income status, gender and age?

As the research question suggests, this chapter focuses on one type of housing precariousness – tenure insecurity. This aspect consists of those who experience housing related forced mobility, also known as being forced to move, which is described earlier in section 4.3.1.

The analysis performed in this chapter aims to fill the following gaps, firstly, there is extensive literature on the effect of tenure insecurity on children's outcomes but not nearly as much on the wellbeing outcomes of adults. The latter form the population of interest in this chapter. Secondly, this chapter conceptualises tenure insecurity as not just a form of housing precariousness, but also a negative form of residential mobility. Hence the analysis compares tenure insecurity with other forms of residential mobility. In doing so, the chapter extends the evidence base not just in the housing precariousness literature but also in the residential mobility literature. Indeed, most studies only explore one or two forms of residential mobility, but this thesis investigates tenure insecurity against four other forms of residential mobility. Thirdly, this analysis covers a more extensive range of wellbeing outcomes than previous studies on housing and wellbeing, each being described previously in section 4.4. Lastly, studies conducted in the past on tenure insecurity using Australian data analyse a shorter period of time, from 2001 to around 2010. However, this thesis utilises 18 years of data from 2001 to 2018.

The remaining sections of this chapter are set out in the following order. Section 5.2 describes the empirical methodology utilised for this chapter, which features fixed effects OLS regression models and estimation of interaction effects. Section 5.3 reports the findings from the analysis performed which sheds light on the relationship between tenure insecurity, other forms of residential mobility and wellbeing.

5.2 Empirical Methodology

In order to address the first key research question, two sets of models are estimated.

5.2.1 Base Model Specification

To estimate the positive and negative effects on wellbeing that tenure insecurity and other forms of residential mobility have, an OLS linear regression model with a fixed effects specification is deployed, as explained in chapter 4. The selection of a fixed effects model over random effects is based on the results from a Hausman test, as explained in section 4.8.4. Specifically, the null hypothesis is rejected at the 5% significance level, therefore indicating fixed effects is more appropriate than random effects.

The base regression model expresses wellbeing outcomes as a function of tenure insecurity and other forms of residential mobility, taking the following general form:

$$Well_{i.t} = \beta_1 * TI_{it} + \beta_2 * RM_{it} + \delta * X_{it} + \Phi_i + \varepsilon_{it} \tag{1}$$

Here i indexes individuals, t indexes time, Φ_i represents individual time-invariant characteristics that control for unobserved heterogeneity such as personality traits while ε_{it} represents a random error term. *Well* represents the wellbeing score while *TI* represents the tenure insecurity indicator and *RM* represents other residential mobility indicators, which are all defined back in chapter 4. *X* captures a vector of controls which are also described previously in chapter 4.

The wellbeing outcomes at time t is matched with the tenure insecurity and other residential mobility predictors and control variables at time t. Due to the questions within the HILDA Survey asking respondents if they have moved in the previous year and the reason, moves measured at time t essentially happened in between t-1 (their last interview) and t (the current interview). Thus, even though tenure insecurity is measured at t, there is already a time lag. This is an attempt to ensure that any causal effects observed are from tenure insecurity and other forms of residential mobility to wellbeing and not in the other direction. The purpose of this is to minimise potential endogeneity due to reverse causation by having the tenure insecurity and other residential mobility

predictors measured a year before the wellbeing outcomes. A total of nine models are estimated using this base specification, with one model capturing each of the nine wellbeing outcomes investigated in this thesis.

5.2.2 Interaction Model Specification

The model specification from equation (1) is expanded to include interaction terms to estimate whether the effect of tenure insecurity and other forms of residential mobility on wellbeing varies across four different population groups:

(i)   Low-income compared to middle-to-high income individuals.

(ii)   Men compared to women.

(iii)   Individuals aged under 35 years old compared to those aged over 35.

(iv)   Individuals aged over 55 years old compared to those aged under 55.

A respondent is classified as low-income if their income is in the lowest 40% of equivalised disposable income, which is explained previously in section 4.3.2. The purpose of the two age groups (iii) and (iv) is to discover if there are different impacts on young adults compared to mature age adults.

The model inclusive of the interaction terms takes the following form:

$$Well_{i.t} = (\alpha_1 * TI_{it} + \gamma_1 * TI_{it}.G_{it}) + (\alpha_2 * RM_{it} + \gamma_2 * RM_{it}.G_{it}) + \delta * X_{it} + \Phi_i + \varepsilon_{it} \quad (2)$$

Equation (2) is essentially the same as (1) except for the new addition of the interaction terms featuring G, which represents the indicator for either low-income status, men, under 35s or over 55s. This results in four separate interaction models with each having an interaction with one of the different group indicators G. For example, if G is to represent low-income status in the interaction model, α_1 measures the impact tenure insecurity has on the wellbeing of the middle-to-high income individuals. The parameter γ_1 then measures the differing impact tenure insecurity has on the wellbeing of low-income individuals in relation to middle-to-high income individuals. Based on this, the sum of the two coefficients ($\alpha_1 + \gamma_1$) indicates the total impact that tenure insecurity has on low-

income respondent's wellbeing. This interpretation of $\alpha_1 + \gamma_1$ can be applied to the other interaction models where *G* indicates either men, those under 35 or those over 55. A total of 36 models are estimated using this interaction specification, each model capturing one of the nine wellbeing outcomes across the four different interaction terms.

5.3 Findings

This section sheds light on the effect of tenure insecurity on Australian's wellbeing via descriptive analysis and regression findings. Subsections 5.3.1 and 5.3.2 uncover the statistical associations between the mean wellbeing scores and tenure insecurity and other residential mobility indicators. Subsections 5.3.3 and 5.3.4 then move onto reporting the regression model findings that estimate the causal impact of tenure insecurity on wellbeing outcomes.

5.3.1 Statistical Association between Tenure Insecurity, Other Forms of Residential Mobility and Wellbeing

Table 5.1 sheds light on the gaps in average scores across wellbeing outcomes between those dealing with tenure insecurity and other forms of residential mobility compared to those who are not. The percentage gap is calculated by deducting the average wellbeing score of the group experiencing tenure insecurity from the group not experiencing tenure insecurity. This difference is then divided by the average score of the entire sample. Therefore, a negative gap indicates that those experiencing tenure insecurity report lower average wellbeing scores than those who do not experience tenure insecurity. In the case of psychological distress however, due to a higher score representing worse levels of distress, a positive gap here indicates the group experiencing tenure insecurity has lower wellbeing than the group not experiencing tenure insecurity. For instance, the mean mental health score of those forced to move is 67.5 while the mental health of those not forced to move is 74.5. The difference of -7 is then divided by the average mental health score for the whole sample of 74.3, then multiplied by 100 to give a percentage gap of

9.4%. This table generally shows that the gaps favour those who are not experiencing tenure insecurity.

Table 5.1 is accompanied by Figure 5.1, which compares the proportion of individuals experiencing tenure insecurity with low wellbeing to those not experiencing tenure insecurity with low wellbeing. For the purposes of Figure 5.1, low wellbeing is defined differently for each of the wellbeing outcomes. Low satisfaction is classified as a score of 7 or lower. A score of 50 or less in mental health, role-emotional health, vitality, role-physical health or social functioning represents low wellbeing. Regarding psychological distress, because of its different scoring style, a score of 22 or greater indicates low wellbeing.

As explained in the previous section, the key indicator of tenure insecurity is forced moves. Unearthing the statistically significant associations between forced mobility and wellbeing. There is at minimum, an 8.2% average wellbeing score deficit for persons who are forced to move from their home as opposed to those not forced to move. The biggest percentage gap is observed in a 21.7% higher psychological distress levels among those experiencing forced moves compared to those not experiencing forced moves, reflecting the rise in stress brought on by having to move house at short notice. Regarding the role-physical scores, this wellbeing outcome displayed trends in table 5.1 inconsistent with the other wellbeing scores. There are statistically insignificant differences across the forced to move and not forced to move groups in most cases.

Figure 5.1 highlights that tenure insecurity is linked to an increased distribution of individuals reporting low wellbeing scores in comparison to those not experiencing insecurity. The percentage point gap between the two groups is the greatest with respect to financial satisfaction at 20.1 percentage points.

In general, other forms of residential mobility are correlated with poorer wellbeing scores than in the absence of mobility, regardless of whether they are housing or non-housing related. Shedding light on the statistical links between housing related voluntary mobility and wellbeing, the percentage gap in wellbeing ranged from 1% to 7%. Although a very small number of cases saw no difference between those voluntarily moving and those who are not. The wellbeing deficit attributed to non-housing related mobility and

voluntary housing-related mobility is similar at around 1.2% to 9%. Individuals who anticipate moving report worse satisfaction and psychological distress scores by 9.2% to 17.5%. Furthermore, spending less than half your life in the one dwelling is associated with worse wellbeing scores across most of the outcomes compared to spending greater than half your life in one place.

Table 5.1: Average Wellbeing Scores and Percentage Gaps by Tenure Insecurity and other Residential Mobility Indicators, 2001 – 2018.

	Satisfaction			Mental/Emotional			Physical		Social
Mobility Indicators	Satisfaction with home (0 – 10)	Satisfaction with community (0 – 10)	Satisfaction with finance (0 – 10)	Mental health (0 – 100)	Psychological distress (10 – 50)	Role – emotional (0 – 100)	Vitality (0 – 100)	Role – physical (0 – 100)	Social functioning (0 – 100)
Mean wellbeing score 2001-2018	8.0	6.7	6.5	74.3	15.7	83.1	59.7	78.5	82.5
Forced moves	7.3**	5.9**	5.2**	67.5**	19.0**	74.9**	54.5**	78.3	75.9**
No forced moves	8.0	6.8	6.6	74.5	15.6	83.4	59.8	78.5	82.7
% Gap	-8.8	-13.4	-21.5	-9.4	21.7	-10.2	-8.9	-0.3	-8.2
Housing-related voluntary mobility	8.0**	6.4**	6.2**	72.4**	16.7**	82.4*	58.7**	82.9**	82.2
No Housing-related voluntary mobility	8.0	6.8	6.6	74.5	15.6	83.2	59.8	78.1	82.5
% Gap	0.0	-6.0	-6.2	-2.8	7.0	-1.0	-1.8	6.1	-0.4
Non-housing-related mobility	7.7**	6.2**	6.1**	72.0**	16.9**	81.4**	59.6	83.7**	81.6**
No non-housing-related mobility	8.0	6.8	6.6	74.6	15.6	83.3	59.7	77.9	82.6
% Gap	-3.8	-9.0	-7.7	-3.5	8.3	-2.3	-0.2	7.4	-1.2
Anticipated residential mobility	6.8**	6.1**	6.0**	71.2**	17.1**	80.8**	58.5**	83.1**	81.0**
No anticipated residential mobility	8.2	6.9	6.6	74.9	15.5	83.6	59.9	77.6	82.8
% Gap	-17.5	-11.9	-9.2	-5.0	10.2	-3.4	-2.3	7.0	-2.2
Duration at current address (<50% of age)	7.9**	6.7**	6.5**	74.1**	15.8**	83.2**	59.5**	78.9**	82.5
Duration at current address (>50% of age)	8.4	7.1	7.0	76.0	15.1	82.9	61.5	74.1	82.7
% Gap	-6.3	-6.0	-7.7	-2.6	4.5	0.4	-3.4	6.2	-0.2

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey.

Note: ** Difference between 'yes' and 'no' statistically significant at the 1% level, *Difference between 'yes' and 'no' statistically significant at the 5% level.

Figure 5.1: Share of Individuals with Low Wellbeing by Tenure Insecurity Indicator, 2001 – 2018.

Forced move vs no Forced move

Indicator	Housing related forced mobility	Not housing related forced mobility
Satisfaction with Home	45.0%	31.1%
Satisfaction with Community	71.4%	58.1%
Satisfaction with Finance	82.0%	61.9%
Mental Health	18.4%	9.5%
Psychological Distress	30.1%	14.8%
Role - Emotional	25.3%	16.2%
Vitality	43.5%	33.0%
Role - Physical	24.1%	23.7%
Social Functioning	23.2%	15.2%

■ Housing related forced mobility   ▪ Not housing related forced mobility

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey.
Notes: Low satisfaction: <= 7; Low Wellbeing (mental health, role-emotional, vitality, role-physical, social functioning): <= 50; High Psychological Distress: >=22.

5.3.2 Do the Wellbeing Outcomes of those Experiencing Tenure Insecurity Vary by Income Status, Gender and Age?

Further analysis is conducted by selecting only persons who have experienced forced mobility to uncover whether their wellbeing outcomes vary by income status, gender and age. The findings are presented in table 5.2. Specifically, the focus is on whether wellbeing outcomes of those experiencing tenure insecurity vary between low-income and middle-to-high income individuals, males and females, people under 35 years old compared to those over 35 and those aged over 55 compared to those under 55. As explained in chapter 2, following a common approach in the literature, an individual is classified as low-income if they are in the lowest 40% of national equivalized income distribution, while middle-to-high income individuals make up the remaining upper 60% (Bentley et al. 2011; Bentley et al. 2016).

It is evident from the results displayed in table 5.2 that low-income persons experiencing either form of tenure insecurity are generally worse off wellbeing wise in comparison to middle-to-high income persons experiencing tenure insecurity. Among those experiencing forced mobility, the most significant gap between the low-income and middle-to-high income groups is seen in psychological distress levels at 15.9%. This highlights how lower economic resources available to individuals can exacerbate the wellbeing penalty attached to tenure insecurity.

The findings demonstrate mixed differences in wellbeing when comparing the genders, although males are generally better off. To start with, males dealing with forced mobility suffer from lower levels of satisfaction with their home and community by around 1.5%. Females facing tenure insecurity, however, are worse off across the rest of the wellbeing outcomes, reporting average scores that are 1.5% to 8.9% lower than males. The psychological distress and vitality levels of females who have been forced to move suffer the greatest gap, the former at 8.3% higher distress levels and the latter 8.9% lower vitality levels.

The presence of an age effect is uncovered next for those experiencing tenure insecurity. Among individuals under 35 years old and over 35, the latter age group generally endures lower mean wellbeing scores. Role-physical health is affected the most, with those forced

to move over 35 years old reporting scores 14.1% lower than their younger counterpart. Other significant relationships include a 6.4% higher mean psychological distress score for the under 35s experiencing forced mobility compared to those who are not.

The difference in wellbeing between individuals over 55 years old and those under 55 facing tenure insecurity is exposed here. The over 55s have higher satisfaction and mental health levels in addition to lower average psychological distress levels. However, they are susceptible to reduced role-emotional health and social functioning. Over 55s who are forced to move have significantly lower scores in role-physical health compared to their younger counterpart by 24.8%, which is the wellbeing outcome with the largest gap.

Table 5.2: Mean Wellbeing Score and Percentage Gap of Individuals Experiencing Tenure Insecurity by Income, Gender and Age, 2001 – 2018.

Tenure Insecurity Interaction Indicator	Satisfaction			Mental/Emotional			Physical		Social
	Satisfaction with Home (0 – 10)	Satisfaction with Community (0 – 10)	Satisfaction with Finance (0 – 10)	Mental Health (0 – 100)	Psychological Distress (10 – 50)	Role-Emotional (0 – 100)	Vitality (0 – 100)	Role-Physical (0 – 100)	Social Functioning (0 – 100)
Forced moves									
Low–income	7.2	5.9	4.7	64.6	20.3	69.5	52.3	73.7	71.2
Middle-to-high income	7.4	6.0	5.6	70.3	17.8	80.0	56.5	82.7	80.3
% Gap	-2.5	-1.5	**-13.8**	-7.7	**15.9**	**-12.6**	-7.0	**-11.5**	**-11.0**
Forced moves									
Male	7.2	5.9	5.2	68.8	18.3	77.2	57.3	81.1	78.3
Female	7.3	6.0	5.1	66.4	19.6	72.8	52.0	75.9	73.8
% Gap	-1.3	-1.5	1.5	3.2	-8.3	5.3	8.9	6.6	5.5
Forced moves									
Under 35	7.4	5.8	5.3	67.2	19.4	76.5	55.0	82.9	77.3
Over 35	7.2	6.1	5.1	68.0	18.4	72.5	53.7	71.8	73.8
% Gap	2.5	-4.5	3.1	-1.1	6.4	4.8	2.2	**14.1**	4.2
Forced moves									
Over 55	7.7	6.4	5.7	70.5	16.4	70.7	55.7	60.4	72.2
Under 55	7.3	5.9	5.1	67.3	19.3	75.2	54.3	79.9	76.2
% Gap	5	7.5	9.2	4.3	**-18.5**	-5.4	2.3	**-24.8**	-4.8

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey. Notes: The values in bold represent the most significant gaps, those greater than 10%

5.3.3 Impact of Tenure Insecurity on Wellbeing

Table 5.3 presents the results from the fixed effects OLS base regression on the impact that tenure insecurity has on different wellbeing outcomes. Moreover, table 5.4 displays the percentage change for all the significant coefficients generated by the tenure insecurity variable and other residential mobility indicators. As some of the wellbeing outcomes are on different scales, the percentage change estimates allow for greater consistency in comparison across wellbeing outcomes than the coefficients. The percentage change is calculated by taking the coefficient and dividing it by the average score of the wellbeing outcome for the entire sample, which is then multiplied by 100.

The overall model diagnostics in table 5.3 firstly display significant F-statistic values across all the models, which is reassuring. Failing to reject the null hypothesis implies that none of the explanatory variables explain variations in the outcome. Next, the R-squared values are considered. This is a goodness of fit statistic that indicates how well the model fits the data, the score ranging from 0 to 1 with the higher the value, the better the fit (Brooks 2014). The R-squared statistics are relatively low, varying from 0.026 to 0.117, which represents that 2.6% to 11.7% of variability within the dependent variable is explained by the model. When analysing wellbeing models though, it is a common to have similarly small R-squared values. Compared to other similar studies, Ong et al. (2018) investigated the effect of intergenerational financial transfers on wellbeing, with some of the R-squared values ranging from 0.047 to 0.136. Foye (2017) analysed the effect of increased living space on wellbeing, their models with life satisfaction and psychological wellbeing as the outcome variable had R-squared values of 0.035 to 0.072. Additionally, Dockery et al. (2013) explored the effect of housing on social and emotional outcomes, also reporting relatively small R-squared statistics of 0.063 to 0.141 for some models.

The tenure insecurity coefficients show that forced mobility causes reductions across most of wellbeing outcomes. In particular, it reduces financial satisfaction and increases psychological distress by around 3%. The 1.1 point decline in mental health recorded by those experiencing forced mobility is consistent with what Mallett et al. (2011) found where those forced to move have 0.6 point lower mental health score after adjusting for

several factors. The significant decline in social functioning by respondents who are forced to move, is akin to the findings by Oishi (2010) and Robinson and Walshaw (2014). These researchers discuss how increased mobility can disrupt an individuals' network and social relationships, often leading to them having a casual and broad social network.

Turning to other residential mobility indicators, the regression results show that relocating voluntarily for housing related reasons or moving for non-housing related reasons negatively impact on only a small range of wellbeing outcomes. The former is associated with 4.5% higher home satisfaction while the latter 1.8% and 0.6% reduced community satisfaction and role-emotional health respectively. Apart from these changes, the other wellbeing outcomes are minimally affected or not significantly affected at all. Those who anticipate having to move in the next 12 months endure lower levels of wellbeing from 1.0% to 11.6%. Specifically, home and community satisfaction suffer the most with a 11.6% and 4.3% reduction respectively. This could be an indication that individuals are more likely to think of relocating in the near future when they are not satisfied with the home they live in and their wider community. Beer et al. (2011) and Dunn (2002) found that even just the fear of being forced to move can negatively impact the wellbeing of individuals. Overall, the reduced community satisfaction brought on by the various forms of mobility is similar to Stokols et al.'s (1983) finding that a higher mobility rate results in a lower sense of community within ones neighbourhood.

The various controls in this model also produce significant effect on wellbeing. Residing in a private rental tenure results in lower scores over a majority of the wellbeing outcomes, the most notable impacts occurring with respect to satisfaction levels, falling by 4.2% to 8.8%. This is alike to what is reported by Dunn (2002) and Pledger et al. (2019) who both concluded that private renters generally experience worse health outcomes than homeowners. In particular, Pledger et al. (2019) unveiled that private renters have 5 point lower mental health than owner occupiers, which ends up being a 6% fall from the population average. Having dependent children results in 3.5% reduced vitality levels in comparison to not having children. Certain marital relationships appear to have a significant detrimental impact on mental, emotional and social wellbeing.

Specifically, being separated or widowed is associated with reduced mental health by 2.4 to 3.7 points, a 3.2% to 5% fall and lower role-emotional health from 6.3% to 7.2% when compared to those who are married. These results indicate the adverse effect to health that marital breakdown or losing your life partner can have.

As one gets older, their role-emotional, vitality, role-physical and social functioning scores all significantly improve. Additionally, a postgraduate or graduate diploma level of education benefits from higher levels of role-emotional health and vitality levels by 1.7% to 3.3%. Regarding employment status, being unemployed or not in the labour force leads to worse mental and emotional wellbeing, role-physical health and social functioning scores compared to full-time employment. Being classified as low-income mainly affects financial satisfaction as opposed to being in the middle-to-high income category. It is clear from the SEIFA deciles that the worse one's area is ranked in terms of relative advantage and disadvantage compared to the highest ranking decile. Generally, the worse wellbeing outcomes are experienced.

The region effects and calendar year flags are included as controls in the regression model, but the coefficients are reported under appendix A1. The region effects are largely statistically insignificant. There is, however, a general trend that wellbeing changes over time. Satisfaction with community and finances appears to improve over time while most of the other wellbeing outcomes are declining over time.

Table 5.3: Effect of Tenure Insecurity and other forms of Residential Mobility at *t* on Wellbeing at *t*, fixed effects OLS model, 2001 – 2018.

| Predictors | Satisfaction | | | Mental / emotional | | | Physical | | Social |
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Forced moves	0.046*	-0.032*	-0.209**	-1.089**	0.454**	-1.254**	-0.957**	-0.658	-1.282**
	(0.021)	(0.024)	(0.023)	(0.173)	(0.111)	(0.394)	(0.194)	(0.406)	(0.257)
Housing-related voluntary mobility	0.361**	0.026*	0.074**	0.004	-0.008	-0.300	-0.203	-0.476	-0.033
	(0.013)	(0.015)	(0.014)	(0.108)	(0.007)	(0.245)	(0.121)	(0.252)	(0.160)
Non-housing-related mobility	0.066**	-0.123**	0.019	-0.223*	0.050	-0.530*	0.230	0.401	-0.205
	(0.013)	(0.014)	(0.014)	(0.106)	(0.070)	(0.240)	(0.118)	(0.248)	(0.157)
Anticipated residential mobility	-0.928**	-0.289**	-0.098**	-1.006**	0.284**	-1.156**	-0.590**	-0.105	-0.893**
	(0.010)	(0.012)	(0.011)	(0.087)	(0.056)	(0.198)	(0.097)	(0.204)	(0.129)
Duration at current address (% of age)	-0.005**	0.001**	-0.002**	-0.008**	0.002	-0.015*	-0.009**	-0.019**	-0.010*
	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)	(0.006)	(0.0003)	(0.006)	(0.004)
Owner with a mortgage	0.002	-0.060**	-0.229**	-0.417**	0.145*	-0.427	-0.618**	-0.207	-0.550**
	(0.013)	(0.015)	(0.014)	(0.109)	(0.073)	(0.247)	(0.122)	(0.254)	(0.161)
Private renter	-0.700**	-0.284**	-0.295**	-0.280*	0.186*	-1.199**	-0.605**	0.013	-0.704**
	(0.017)	(0.019)	(0.018)	(0.140)	(0.093)	(0.317)	(0.156)	(0.27)	(0.207)
Public renter	-0.770**	-0.276**	-0.265**	0.034	0.198	-1.379	-0.042	-0.329	-1.118*
	(0.037)	(0.043)	(0.041)	(0.312)	(0.214)	(0.710)	(0.349)	(0.731)	(0.464)
Other tenure type	-0.468**	-0.121**	-0.066*	-0.259	-0.109	-0.266	-0.017	-0.573	-0.423
	(0.027)	(0.031)	(0.030)	(0.227)	(0.149)	(0.516)	(0.254)	(0.531)	(0.337)
Dependent children	-0.174**	0.093*	-0.135**	-0.386**	-0.110	0.570*	-2.115**	1.183**	0.565**
	(0.013)	(0.015)	(0.014)	(0.107)	(0.071)	(0.244)	(0.120)	(0.251)	(0.159)
De facto	0.158**	-0.084**	-0.114**	0.220	0.065	-0.912**	0.851**	-0.349	-0.316
	(0.018)	(0.020)	(0.020)	(0.149)	(0.098)	(0.339)	(0.167)	(0.318)	(0.222)
Separated	-0.142**	-0.119**	-0.758**	-3.699**	1.374**	-5.992**	-0.671*	0.677	-3.767**
	(0.028)	(0.032)	(0.030)	(0.232)	(0.157)	(0.527)	(0.259)	(0.543)	(0.344)
Divorced	-0.035	-0.114**	-0.601**	-0.707**	0.271	-2.777**	0.658*	0.495	-1.328**
	(0.028)	(0.032)	(0.030)	(0.233)	(0.163)	(0.529)	(0.260)	(0.545)	(0.345)
Widowed	-0.051	-0.138**	-0.147**	-2.407**	0.413*	-5.243**	-1.120**	-2.466**	-3.549**
	(0.034)	(0.039)	(0.037)	(0.286)	(0.202)	(0.649)	(0.320)	(0.669)	(0.424)
Single not married	0.309**	-0.010	-0.275**	-1.185**	0.562**	-3.710**	1.296**	-0.277	-2.397**
	(0.023)	(0.027)	(0.026)	(0.197)	(0.131)	(0.447)	(0.220)	(0.461)	(0.292)
Age 25 - 34	-0.183**	0.075**	-0.075**	-0.681**	0.410**	-0.402	0.369*	2.753**	1.028**
	(0.019)	(0.022)	(0.021)	(0.162)	(0.105)	(0.368)	(0.181)	(0.379)	(0.240)
Age 35 - 44	-0.144**	0.175**	-0.172**	-1.090**	0.530**	0.494	1.354**	6.706**	2.783**
	(0.028)	(0.032)	(0.031)	(0.234)	(0.154)	(0.532)	(0.262)	(0.548)	(0.347)

	Satisfaction			Mental / emotional			Physical		Social
Predictors	**Satisfaction with home**	**Satisfaction with community**	**Satisfaction with finance**	**Mental health**	**Psychological distress**	**Role - emotional**	**Vitality**	**Role - physical**	**Social functioning**
Age 45 - 54	-0.034 (0.035)	0.170** (0.041)	-0.266** (0.039)	-0.853** (0.297)	0.605** (0.193)	2.526** (0.674)	2.581** (0.332)	9.637** (0.694)	4.082** (0.441)
Age 55 - 64	0.039 (0.043)	0.186** (0.050)	-0.159** (0.048)	0.546 (0.364)	0.155 (0.232)	6.092** (0.828)	4.517** (0.408)	12.742** (0.853)	6.373** (0.541)
Age 65+	0.061 (0.053)	0.289** (0.060)	0.114* (0.058)	2.188** (0.442)	-0.480 (0.275)	9.410** (1.005)	6.317** (0.495)	15.085** (1.035)	8.304** (0.657)
Has long-term health condition	-0.019 (0.010)	-0.127** (0.012)	-0.123** (0.011)	-2.507** (0.087)	0.867** (0.056)	-6.355** (0.198)	-4.371** (0.098)	-12.311** (0.204)	-6.073** (0.129)
Postgraduate	-0.027 (0.052)	0.274** (0.060)	0.116* (0.057)	0.805 (0.437)	-0.118 (0.296)	2.521* (0.992)	1.072* (0.488)	2.162* (1.022)	1.491* (0.648)
Graduate diploma	-0.001 (0.050)	0.225** (0.057)	0.109* (0.054)	0.510 (0.416)	0.027 (0.295)	2.764** (0.946)	1.033* (0.466)	1.387 (0.974)	0.567 (0.618)
Undergraduate	-0.058 (0.036)	0.149** (0.041)	0.079* (0.039)	0.258 (0.301)	-0.055 (0.204)	0.432 (0.684)	0.684* (0.337)	-0.478 (0.705)	0.098 (0.447)
Diploma	-0.013 (0.040)	0.061 (0.046)	0.032 (0.044)	0.558 (0.335)	-0.043 (0.225)	1.192 (0.762)	0.352 (0.375)	0.425 (0.785)	1.050* (0.498)
Certificate	-0.070** (0.025)	-0.028 (0.028)	0.014 (0.027)	0.109 (0.206)	-0.053 (0.142)	-0.375 (0.469)	0.148 (0.231)	0.325 (0.501)	0.401 (0.306)
Part-Time	-0.028* (0.012)	0.026* (0.014)	-0.442** (0.013)	-0.185 (0.099)	0.371** (0.064)	-0.823** (0.226)	0.758** (0.111)	-1.526** (0.233)	-0.450** (0.148)
Unemployed	-0.032 (0.022)	-0.084** (0.025)	-1.542** (0.024)	-1.823** (0.186)	0.690** (0.121)	-4.849** (0.422)	1.800** (0.208)	-1.758** (0.435)	-1.768** (0.276)
Not in the labour force	-0.016 (0.014)	-0.007 (0.016)	-0.703** (0.016)	-1.384** (0.120)	0.665** (0.079)	-6.273** (0.272)	-0.556** (0.134)	-7.556** (0.280)	-4.158** (0.178)
Lowest SEIFA decile	-0.575** (0.031)	-0.381** (0.036)	0.031 (0.034)	-0.317 (0.261)	0.571** (0.174)	-0.116 (0.592)	-0.982** (0.291)	-0.838 (0.160)	-1.123** (0.387)
Second SEIFA decile	-0.509** (0.029)	-0.295** (0.034)	-0.020 (0.032)	-0.072 (0.248)	0.279* (0.165)	0.263 (0.563)	-0.930** (0.277)	-1.065 (0.579)	-0.587 (0.368)
Third SEIFA decile	-0.461** (0.029)	-0.264** (0.033)	-0.068* (0.032)	-0.586* (0.242)	0.538** (0.161)	-0.371 (0.549)	-0.888** (0.270)	-1.132* (0.566)	-1.093** (0.359)
Fourth SEIFA decile	-0.362** (0.029)	-0.214** (0.033)	-0.051 (0.032)	-0.336 (0.241)	0.505** (0.160)	0.444 (0.548)	-1.041** (0.270)	-0.271 (0.564)	-0.534 (0.358)
Fifth SEIFA decile	-0.372** (0.028)	-0.259** (0.033)	-0.062* (0.031)	-0.499* (0.239)	0.513** (0.160)	-0.024 (0.543)	-1.122** (0.267)	-1.139* (0.559)	-0.792* (0.355)

Predictors	Satisfaction			Mental / emotional			Physical		Social
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Sixth SEIFA decile	-0.305** (0.028)	-0.163** (0.032)	0.043 (0.031)	-0.068 (0.236)	0.332* (0.157)	-0.694 (0.537)	-0.700** (0.264)	-1.238* (0.553)	-0.815* (0.351)
Seventh SEIFA decile	-0.229** (0.027)	-0.140** (0.031)	0.042 (0.030)	-0.411 (0.227)	0.433** (0.151)	0.065 (0.516)	-0.690** (0.254)	-0.265 (0.531)	-0.658 (0.337)
Eighth SEIFA decile	-0.208** (0.026)	-0.092** (0.030)	-0.015 (0.029)	-0.340 (0.220)	0.440** (0.146)	-0.272 (0.499)	-0.576* (0.246)	-0.293 (0.514)	-0.499 (0.326)
Ninth SEIFA decile	-0.149** (0.024)	-0.040 (0.028)	-0.051 (0.027)	-0.271 (0.205)	0.273* (0.138)	-0.550 (0.466)	-0.528* (0.229)	-0.945* (0.480)	-0.553 (0.304)
Low-income	-0.026** (0.010)	0.021* (0.011)	-0.325** (0.011)	-0.179* (0.083)	0.085 (0.054)	-0.245 (0.189)	-0.176 (0.093)	-0.156 (0.195)	-0.277* (0.123)
Constant	8.521**	6.598**	6.868**	76.213**	14.507**	87.631**	62.192**	84.908**	85.431**
N	201,303	201,303	201,303	201,303	70,710	201,303	201,303	201,303	201,303
R-Squared	0.111	0.066	0.117	0.080	0.077	0.068	0.050	0.087	0.026
F-Stat	240.89**	46.86**	181.71**	61.71**	13.45**	44.05**	69.00**	117.22**	69.29**

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey.

Notes: ** $p < 0.01$, * $p < 0.05$. The reference categories are outright owner, legally married, age 15-24 years, highest qualification from high school, full-time employed, Highest SEIFA decile and middle-to-high income. Standard errors are in parentheses. Region and Wave coefficients are reported in Appendix A1

Table 5.4: Effect of Tenure Insecurity and other forms of Residential Mobility at *t* on Wellbeing at *t* – Percentage Change, 2001 – 2018.

Predictors	Satisfaction			Mental / emotional			Physical		Social
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Forced moves	0.6%	-0.5%	**-3.2%**	-1.5%	**2.9%**	-1.5%	-1.6%		-1.6%
Housing-related voluntary mobility	**4.5%**	0.4%	1.1%						
Non-housing-related mobility	0.8%	-1.8%		-0.3%		-0.6%			
Anticipated residential mobility	**-11.6%**	**-4.3%**	-1.5%	-1.4%	1.8%	-1.4%	-1.0%		-1.1%
Duration at current address (% of age)	-0.06%	0.01%	-0.03%	-0.1%		-0.02%	-0.02%	-0.02%	-0.01%

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey.

Notes: Only statistically significant results at the 1% and 5% level are reported in this table. The bold and shaded cells represent some of the most significant relationships.

5.3.4 Impact of Low-income Status, Gender and Age on the Wellbeing of Individuals Experiencing Tenure Insecurity

Tables 5.5 to 5.8 all report the results from the interaction models, in which tenure insecurity is interacted with income status, gender, age under 35 years and age over 55 years. The purpose of this is to further explore the different effects of tenure insecurity on wellbeing across these socio-demographic groups. As indicated in equation (2), these interaction models include the same control variables as in the base regression. However, due to space considerations, only the tenure insecurity variable and their interaction terms are reported in these tables.

Table 5.5 documents the differing impact of tenure insecurity on wellbeing between those who are classified as low-income and those who are classified as middle-to-high income. Turning first to the interactions between low-income status and forced moves, it would appear that low-income status does not mediate the effect of forced moves on wellbeing.

Moving onto table 5.6 which presents the difference in effect of tenure insecurity between males and females, it is clear that gender does not have an influence on the experiences of tenure insecurity. The table shows that the impact of forced moves on wellbeing are not statistically different between males and females.

The differing effect that tenure insecurity has on wellbeing between those under 35 years old and those over 35 years old is unveiled in table 5.7. Youth appears to partially offset the negative impact that being forced move has on one's satisfaction with the home they live in and feeling part of the local community.

The mature age effect of tenure insecurity is presented in table 5.8, with their generally being mixed results between those over 55 and those under 55. The interactions between the over 55s and housing-related forced mobility show that the negative impacts of forced moves are magnified for the older age group in the domains of home and community satisfaction. Financial satisfaction, psychological distress, vitality and social functioning, however, all see an improvement for the over 55s who are forced to move compared to under 55s who are forced to move.

Table 5.5: Difference in Impact of Tenure Insecurity and Other Forms of Residential Mobility at *t* on Wellbeing at *t* by Income Status, 2001 – 2018.

	Satisfaction			Mental / Emotional			Physical		Social
Predictors	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Low-income	0.007 (0.017)	0.057** (0.019)	-0.396** (0.018)	0.046 (0.141)	0.041 (0.091)	0.343 (0.319)	0.179 (0.157)	0.313 (0.329)	-0.026 (0.209)
Forced moves	0.067* (0.028)	-0.061 (0.032)	-0.225** (0.031)	-0.894** (0.237)	0.450** (0.153)	-0.900 (0.538)	-0.906** (0.265)	-0.701 (0.555)	-0.915** (0.352)
Forced moves x Low-income	-0.043 (0.041)	0.054 (0.047)	0.029 (0.045)	-0.419 (0.343)	0.013 (0.220)	-0.762 (0.779)	-0.126 (0.383)	0.056 (0.802)	-0.780 (0.509)
Constant	8.513**	6.587**	6.891**	76.151**	14.512**	87.457**	62.086**	84.768**	85.357**
N	201,303	201,303	201,303	201,303	70,710	201,303	201,303	201,303	201,303
R-Squared	0.112	0.066	0.117	0.080	0.078	0.068	0.050	0.087	0.101
F-Stat	222.98**	43.48**	168.35**	29.36**	12.20**	40.60**	63.57**	107.82**	63.77**

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey. Notes: ** $p < 0.01$, * $p < 0.05$. Standard errors are in parentheses. The residential mobility indicators and control variables are not reported here due to space considerations.

Table 5.6: Difference in Impact of Tenure Insecurity and Other Forms Residential Mobility at *t* on Wellbeing at *t* by Gender, 2001 – 2018.

	Satisfaction			Mental / emotional			Physical		Social
Predictors	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Male	0 (omitted)	0 (omitted)	0 (omitted)	0 (omitted)	0 (omitted)	0 (omitted)	0 (omitted)	0 (omitted)	0 (omitted)
Forced moves	0.056* (0.028)	-0.060 (0.032)	-0.197** (0.031)	-0.977* (0.237)	0.508** (0.153)	-0.541 (0.538)	-1.087** (0.265)	-0.747 (0.554)	-1.286** (0.352)
Forced moves x Male	-0.023 (0.041)	0.058 (0.047)	-0.027 (0.045)	-0.241 (0.347)	-0.111 (0.223)	-1.532 (0.788)	0.286 (0.388)	0.196 (0.812)	0.012 (0.515)
Constant	8.523**	6.600**	6.869**	76.224**	14.506**	87.634**	62.179**	84.897**	85.431**
N	201,303	201,303	201,303	201,303	70,710	201,303	201,303	201,303	201,303
R-Squared	0.110	0.065	0.117	0.080	0.077	0.068	0.049	0.086	0.102
F-Stat	223.71**	43.29**	167.11**	29.41**	12.23**	40.60**	63.51**	107.75**	63.75**

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey. Notes: ** $p < 0.01$, * $p < 0.05$. Standard errors are in parentheses. The residential mobility indicators and control variables are not reported here due to space considerations.

Table 5.7: Difference in Impact of Tenure Insecurity and Other Forms of Residential Mobility at *t* on Wellbeing at *t* by Age, 2001 – 2018.

| Predictors | Satisfaction | | | Mental / Emotional | | | Physical | | Social |
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Under 35	-0.291**	-0.167*	0.077**	0.554**	-0.113	-0.205	-0.352	-2.772**	-1.160**
	(0.020)	(0.023)	(0.022)	(0.170)	(0.117)	(0.387)	(0.191)	(0.399)	(0.253)
Forced moves	-0.075*	-0.111*	-0.182**	-0.901**	0.391*	-1.671**	-0.703*	-0.246	-1.099**
	(0.031)	(0.036)	(0.034)	(0.260)	(0.164)	(0.592)	(0.291)	(0.610)	(0.387)
Forced moves x Under 35	0.230**	0.144**	-0.050	-0.344	0.098	0.724	-0.468	-0.785	-0.355
	(0.041)	(0.047)	(0.045)	(0.346)	(0.222)	(0.787)	(0.387)	(0.811)	(0.514)
Constant	8.591**	6.791**	6.730**	75.583**	14.666**	89.298**	63.886**	92.030**	88.637**
N	201,303	201,303	201,303	201,303	70,710	201,303	201,303	201,303	201,303
R-Squared	0.093	0.056	0.085	0.035	0.042	0.094	0.066	0.197	0.142
F-Stat	239.80**	46.12**	173.17**	28.27**	11.74**	40.29**	63.84**	111.39**	65.14**

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey. Notes: ** p < 0.01, * p < 0.05. Standard errors are in parentheses. The residential mobility indicators and control variables are not reported here due to space considerations.

Table 5.8: Difference in Impact of Tenure Insecurity and Other Forms of Residential Mobility at *t* on Wellbeing at *t* by Age, 2001 – 2018.

| Predictors | Satisfaction | | | Mental / Emotional | | | Physical | | Social |
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Over 55	0.203**	0.127**	0.144**	1.487**	-0.502**	4.144**	1.917**	2.540**	1.968**
	(0.023)	(0.026)	(0.025)	(0.190)	(0.128)	(0.432)	(0.213)	(0.445)	(0.282)
Forced moves	0.068**	-0.017	-0.234**	-1.161**	0.551**	-1.358**	-1.093**	-0.864*	-1.491**
	(0.022)	(0.025)	(0.024)	(0.182)	(0.117)	(0.413)	(0.203)	(0.425)	(0.270)
Forced moves x Over 55	-0.209**	-0.150*	0.306**	0.864	-1.001**	1.453	1.610*	2.381	2.334**
	(0.072)	(0.083)	(0.079)	(0.606)	(0.365)	(1.376)	(0.677)	(1.418)	(0.899)
Constant	8.407**	6.685**	6.735**	75.535**	14.883**	88.267**	63.320**	89.975**	87.535**
N	201,303	201,303	201,303	201,303	70,710	201,303	201,303	201,303	201,303
R-Squared	0.102	0.053	0.110	0.067	0.068	0.094	0.070	0.208	0.148
F-Stat	235.97**	45.69**	172.81**	28.74**	12.09**	41.53**	65.31**	110.98**	65.66**

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey. Notes: ** p < 0.01, * p < 0.05. Standard errors are in parentheses. The residential mobility indicators and control variables are not reported here due to space considerations.

5.4 Chapter Summary

This chapter aims to answer the first research question of the thesis concerning the effect of tenure insecurity on the wellbeing of Australian adults and examines whether this effect is different by income status, gender, and age.

The results presented in this chapter highlight the adverse impact that tenure insecurity can have on one's wellbeing levels. The wellbeing domains that are affected differ between the two types of tenure insecurity – forced moves and private renting. One of the main points to take away is that forced mobility is associated with around 3% lower financial satisfaction and 3% increased psychological distress level. Private renting can lead to a 4.2% to 8.8% reduction in satisfaction.

Regarding the different interactions that are estimated, low-income status magnifies the negative impact of private rental status on role-emotional health and vitality. There is no significant difference in the effect of tenure insecurity on wellbeing between genders when other factors are controlled for. However, some mixed age effects do exist. Youth appears to mitigate the negative impact tenure insecurity has on wellbeing. The exception to this though is with mental health, with under 35s in private rental appearing to suffer a greater reduction than the over 35s when other factors are controlled for. Among those suffering forced moves, the over 55s appear to cope better than the under 55s in some domains – namely financial satisfaction, psychological distress, vitality levels and social wellbeing. Conversely, they fare worse in the satisfaction with home and community domains. Furthermore, being classified as over 55 amplifies the negative effect of private rental on role-emotional health and vitality levels compared to those under 55.

The following chapter sets out the next piece of major analysis of this thesis, shedding light on which dimensions of housing precariousness have the greatest impact on wellbeing and which dimensions of wellbeing have the greatest impact on precarious housing. Hence, it extends the range of precarious housing dimensions being investigated beyond tenure insecurity to unaffordable housing, unsuitable housing and insecure neighbourhoods. The next chapter draws on a combination of OLS modelling and logistic regressions to model the bi-directional relationship between housing precariousness and wellbeing.

Chapter 6 – The Bi-Directional Relationship Between Precarious Housing and Wellbeing

6.1 Introduction

This chapter moves onto exploring if there is a bi-directional relationship between different aspects of housing precariousness and wellbeing, that is, it addresses the second research question of the thesis as follows:

Which dimensions of housing precariousness have the largest impact on the wellbeing of Australian adults? Which dimensions of wellbeing have the largest impact on housing precariousness?

The analysis conducted aims to fill a gap in the literature in the following ways. Firstly, the use of separate indicators for precarious housing and wellbeing will better account for the multi-dimensionality of these two concepts than a single indicator can. The findings can therefore pinpoint which domains of precarious housing are more important than others in influencing the different wellbeing outcomes, as well as which specific wellbeing outcomes are more likely to be impacted by precarious housing. For instance, unaffordability may not affect mental health in the same way that it could affect satisfaction, or insecure neighbourhoods might not alter wellbeing as significantly as unsuitable housing does.

Secondly, the role of neighbourhood dimensions as a form of housing precariousness is estimated. Specifically, it will investigate the effect of insecure neighbourhoods on wellbeing in addition to more common housing-specific dimensions such as tenure insecurity, unsuitable housing and unaffordable housing. The literature currently features few studies that quantitatively analyse all four housing precariousness domains together, with only one study containing a small sample size from a single year having been found to do this[2].

Thirdly, the analysis in this chapter examines if there is evidence of a relationship in the opposite direction, that is, whether wellbeing influences a respondent's level of housing

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[2] Baker et al. (2017) – Sample size of 1008, data solely from 2013.

precariousness. It is important to model the relationship between housing precariousness and wellbeing in both directions because it sheds light on whether precarious housing problems are more likely to negatively affect wellbeing, or whether those with poor wellbeing are more likely to report housing issues.

The rest of this chapter is organised in the following manner. Section 6.2 covers the empirical methodology deployed for this chapter including the model specifications as well as the OLS and logit statistical techniques used across the models. Section 6.3 then presents descriptive statistics and regression findings to provide empirical estimates of the relationships between the various precarious housing and wellbeing indicators.

6.2 Part 2 Empirical Methodology

The aim of this section is to set out the methodology used for this chapter of the analysis, estimating the effect the different forms of housing precariousness have on the separate wellbeing outcomes and vice versa. In order to estimate this causal effect, two sets of model specifications are applied.

6.2.1 Model Set 1: Impact of housing precariousness on wellbeing

The first set of models will estimate the impact of the separate precarious housing indicators on the separate wellbeing outcomes. This is expressed algebraically in equation (1).

$$Well_{i.t+1} = \beta^* Prec_{it} + \delta^* X_{it} + \Phi_i + \varepsilon_{it} \qquad (1)$$

Where i indexes individuals and t indexes time. Φ_i represents time-invariant characteristics that control for unobserved heterogeneity such as personality traits and ε_{it} represents a random error term. *Well* represents an individual's wellbeing score while *Prec* represents the precarious housing indicators. *X* captures a vector of controls which includes socio-economic characteristics, geography, and different calendar years. With wellbeing as the outcome of interest, the wellbeing outcomes at time $t+1$ are matched with the precarious housing predictors at time t. The approach attempts to minimise

potential endogeneity due to reverse causation by matching precarious housing predictors observed in a year with wellbeing outcomes a year later. A total of nine models are executed, each accounting for one wellbeing outcome.

An OLS linear specification is deployed to this set of models as the dependent variables are treated as continuous. Further to this, fixed effects is chosen as the Breusch-Pagan Lagrange multiplier test and Hausman test explained in chapter 4 indicate that fixed effects is more appropriate. The use of OLS models to estimate the effect of wellbeing is common, with other studies such as those by Kendall et al. (2018) and Ong et al. (2019) who include similar variables as this thesis, deploy this specification.

6.2.2 Model Set 2: Impact of wellbeing on housing precariousness

In the second set of models, the impact of the wellbeing predictors on precarious housing outcomes are estimated. As in the case of section 5.2.1, the precarious housing and wellbeing variables are entered into the model separately, resulting in seven models within this set with each addressing one precarious housing outcome. The models have the precarious housing indicators at time $t+1$ and matched with wellbeing at time t in order to examine if wellbeing has an influence on an individual experiencing precarious housing a year later.

Both the logistic regression and OLS techniques will be deployed within this set of models. The logit model is applied to the models where the outcomes are binary, specifically the probability of being forced to move, experiencing unaffordability and experiencing overcrowding. The insecure neighbourhood aspects of crime, hostility and SEIFA index are estimated using OLS due to these variables being continuous. This logit and OLS models are expressed algebraically in equations (2) and (3) respectively:

$$ProbPrec_{it+1} = \frac{1}{1+e^{-(\beta^*Well_{it}+\beta^*x_{it}+\Phi_i+\varepsilon_i)}} \tag{2}$$

Where *ProbPrec*$_{it}$ represents the probability of a respondent i at time $t+1$ encountering precarious housing in the form of being forced to move, experiencing unaffordable housing or experiencing overcrowding. β represents the coefficients while *Well* represents

the wellbeing variables. The control variables are indicated by *x*, while *Φ* represents the time invariant characteristics that control for unobserved heterogeneity and *ε* the error term.

$$Prec_{i.t+1} = \beta^* Well_{it} + \delta^* X_{it} + \Phi_i + \varepsilon_{it} \tag{3}$$

Equation (3) carries over the same algebraic expression as equation (1) with the precarious and wellbeing aspects being reversed. Here, *Prec* represents the three insecure neighbourhood domains. The Hausman test is again used for this set of models, with the result indicating that a fixed effects specification is more appropriate for both forms of regression. As fixed effects models control for time invariant effects, all observations pertaining to an individual are dropped from the logit model if an outcome takes the same value over all the waves. For example, if a respondent is in unaffordable housing across all their waves of observations, then they will be dropped. As there is no variation in their outcome (unaffordability) in all the waves they are observed. This results in 45,464 observations being dropped from the logit model of the probability of unaffordability, leaving 14,548 observations that feature within-person variation in private renter status available for modelling purposes. This restriction does not apply to the OLS models. In addition, as explained in chapter 4, the psychological distress variable is only observed in every second wave from wave 7 onwards. It is therefore omitted from this second set of models because if it is entered into the models as an explanatory variable, the number of observations available for modelling would be significantly reduced.

6.3 Findings

This section highlights the key findings that have emerged from the descriptive analysis and fixed effects regression models. Subsection 6.3.1 documents descriptive statistics of the precarious housing indicators and wellbeing outcomes, shedding light on the statistical associations between average precarious housing and wellbeing scores. As hypothesized in the previous section, the causal relationship between precarious housing and wellbeing is likely to be bi-directional. However, descriptive statistics mask the strength and direction of these causal flows. Therefore, these important details are

uncovered through an extensive set of fixed regression model findings, which are reported in subsections 6.3.2 and 6.3.3.

It is notable that the forced moves variable is entered into regression models in both chapter 5 (as a form of tenure insecurity) and this chapter (as a form of housing precariousness). Forced moves were measured at the same wave as wellbeing in chapter 5, while it is measured at one wave before the wellbeing outcome in this chapter. This allows the findings in this chapter to serve as a type of sensitivity analysis to the results from chapter 5. Specifically, a comparison of the effects of forced moves in chapters 5 and 6 sheds light on whether the timing of measurement of the forced moves variable affects wellbeing outcomes.

6.3.1 Precarious Housing and Wellbeing

Table 6.1 presents the socio-economic profile of the HILDA Survey respondents experiencing housing precariousness. The rightmost column of the table presents the average profile of all individuals combining those who experience housing precariousness with those not experiencing housing precariousness. These act as a control group against which those experiencing housing precariousness can be compared. The observations are from pooled person-period data across the 18 waves of the HILDA Survey as described in chapter 4.

Overall, the statistics in table 6.1 suggest persons who endure housing precariousness are generally in more precarious life circumstances than the general population. This table shows that those experiencing any form of housing precariousness are more likely to be low-income than the general sample. Compared to the average age of 44 years across the entire sample, those living in precarious housing are found to be relatively younger, with individuals having been forced to move or residing in overcrowded conditions around 10 years more youthful. Those who are married are under-represented among precarious housing residents, while those who have suffered marital breakdown in the form of divorce or separation, and those who are single never married are over-represented among those in precarious housing.

Regarding labour force status, unemployed persons are overrepresented across all forms of precarious housing while surprisingly, persons not in the labour force are underrepresented amongst those dealing with tenure insecurity. This latter association could potentially be an indication of those who have exited the work force via retirement and reside in their own home, thus reducing the possibility of them being forced to move from their dwelling.

With respect to locations, it would appear individuals living in Sydney are more commonly in crowded conditions than other states. On the other hand, those in the rest of Queensland are more likely than the average population to be forced to move or experience unaffordability issues.

Table 6.2 displays the number of respondents transitioning between the different tenure types – homeowners (outright or with a mortgage), private renters, public renters and those classified as other. The largest amount of movement occurring from outright owners at time t to owners with a mortgage at time $t+1$ and vice versa at 2% - 3% of the sample. The next biggest trend of relocation occurred between private renters and owners with a mortgage in both directions.

Table 6.1: Characteristics of respondents experiencing precarious housing, 2001 – 2018.

Characteristics	Tenure Insecurity	Unaffordable Housing	Overcrowded	Insecure Neighbourhood			All
	Forced Move	Housing Cost >30% & Income Lowest 40%	Overcrowded	Neighbourhood Crime – Common*	Neighbourhood Hostility – Common*	Lowest 2 SEIFA deciles	
Low-Income (%)	50.5%	100%	56.5%	40.8%	44.9%	57.5%	37.1%
Sex (%)							
Male	47.8%	44.8%	47.1%	45.7%	48.9%	46.9%	47.4%
Female	52.2%	55.2%	52.9%	54.3%	51.1%	53.1%	52.6%
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Age band (mean years)	34.3	39.2	34.9	40.8	38.8	45.6	44.3
Marital Status (%)							
Married	23.5%	30.4%	29.25%	38.4%	33.1%	40.0%	48.0%
De-Facto	26.1%	13.9%	15.2%	17.9%	19.2%	14.5%	14.3%
Separated	5.3%	5.6%	3.9%	3.0%	3.0%	4.1%	2.7%
Divorced	8.5%	9.9%	5.8%	6.6%	6.2%	8.9%	6.0%
Widowed	1.5%	4.6%	3.5%	4.5%	4.6%	7.1%	5.0%
Single, not married	35.2%	35.5%	42.4%	29.7%	33.9%	25.3%	24.1%
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Labour force status (%)							
Full-time Employed	43.7%	27.7%	30.4%	41.8%	39.8%	31.7%	42.5%
Part-time Employed	21.5%	23.0%	21.5%	20.4%	18.9%	17.5%	20.9%
Unemployed	9.1%	8.8%	10.6%	5.4%	6.9%	6.2%	3.9%
Not in the labour force	25.7%	40.5%	37.5%	32.4%	34.4%	44.6%	32.7%
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Location							
Sydney	14.9%	18.8%	25.4%	18.7%	20.0%	15.0%	16.7%
Rest of NSW	11.9%	12.6%	11.0%	12.1%	13.1%	22.0%	13.3%
Melbourne	15.8%	15.8%	15.9%	19.2%	16.1%	10.1%	17.4%

Characteristics	Tenure Insecurity	Unaffordable Housing	Overcrowded	Insecure Neighbourhood			All
	Forced Move	Housing Cost >30% & Income Lowest 40%	Overcrowded	Neighbourhood Crime – Common*	Neighbourhood Hostility – Common*	Lowest 2 SEIFA deciles	All
Rest of Victoria	6.4%	6.8%	7.5%	6.3%	7.2%	8.2%	7.6%
Brisbane	12.7%	10.5%	7.9%	9.5%	9.3%	7.8%	9.3%
Rest of QLD	15.6%	14.5%	13.4%	10.4%	12.4%	13.7%	11.5%
Adelaide	5.9%	5.8%	6.9%	6.5%	5.9%	7.2%	6.4%
Rest of SA	2.3%	1.9%	2.4%	2.4%	3.1%	5.9%	2.9%
Perth	6.4%	6.6%	2.9%	7.4%	5.5%	1.8%	6.8%
Rest of WA	2.1%	2.2%	1.6%	2.2%	2.5%	2.6%	2.4%
Tasmania	3.4%	3.0%	3.1%	2.8%	2.7%	5.4%	3.1%
NT	0.6%	0.3%	1.0%	0.9%	1.1%	0.2%	0.7%
ACT	2.1%	1.3%	1.1%	1.7%	1.3%	0.1%	2.0%
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Person-period observations	269,277	269,277	269,277	228,129	237,186	269,277	269,277

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Note: * A score of 4 or 5 was used to indicate a respondent commonly experiencing neighbourhood crime or hostility

Table 6.2: Transitions across different tenure types between t and t+1, 2001 – 2018.

Housing tenure t	Housing tenue $t+1$					
	Outright owner	Owner with a mortgage	Private renter	Public renter	Other tenure type	All
Outright owner	30.77%	2.69%	0.56%	0.02%	0.26%	34.3%
Owner with a mortgage	2.19%	29.92%	1.80%	0.06%	0.23%	34.2%
Private renter	0.91%	1.45%	21.70%	0.44%	0.50%	25%
Public renter	0.02%	0.04%	0.41%	3.22%	0.03%	3.72%
Other tenure type	0.33%	0.22%	0.55%	0.03%	1.65%	2.78%
All	34.22%	34.32%	25.02%	3.77%	2.67%	100.0%

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Table 6.3 documents the mean wellbeing scores of individuals based on the number of different aspects of precarious housing they experience in the same year. There is a minimum of zero forms of precarious housing and a maximum of four forms covering tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods. If an individual experiences neighbourhood crime and neighbourhood hostility, this only counts as one form as they are both forms of insecure neighborhoods. On the other hand, if they are forced to move and are living in overcrowded conditions, then this counts as two forms of precarious housing.

Overall, 52.46% of the sample reported experiencing no forms of housing precariousness, which leaves 47.54% having encountering at least one. Further to this, 7.71% dealt with two and 0.67% three forms of precarious housing. These statistics highlight how ever-present housing precariousness is in Australian society, with just under half of the sample suffering from one form of precariousness. These statistics are also similar to what Clair et al. (2019) discovered in Europe, with over 50% of the European population recorded to have at least one form of housing precariousness.

The general trend evident from this table is that an individual's average wellbeing declines incrementally for each extra form of housing precariousness reported compared to zero forms. This is seen in figure 6.1 which presents these percentage gaps in wellbeing score between those reporting zero forms of precariousness compared to those reporting four forms. Thus, these results highlight the compounding negative effect that each additional form of housing precariousness has on the wellbeing of Australian adults, which has also been uncovered in studies by Baker et al. (2017), Mallett et al. (2011) and Ziersch et al. (2017).

There are some noteworthy observations specific to particular wellbeing outcomes. Within the satisfaction domain, financial satisfaction displays the greatest decline of 46.4% between zero to four forms of precarious housing. Within the mental and emotional health domain, scores decline by between 6.6% to 43%, with psychological distress bearing the brunt of the most significant decrease across outcomes in the mental and emotional domain. Lastly, physical outcomes decline by around 14% and social

functioning underwent a 18% decline when one moves from zero to four forms of precariousness.

Table 6.3: Mean Wellbeing Score, by Number of Different Forms of Housing Precariousness Experienced, 2001 – 2018.

Number of precarious housing aspects	% of Sample	Satisfaction			Mental/Emotional			Physical		Social
		Satisfaction with Home (0 – 10)	Satisfaction with Community (0 – 10)	Satisfaction with Finance (0 – 10)	Mental Health (0 – 100)	Psychological Distress (10 – 50)	Role-Emotional (0 – 100)	Vitality (0 – 100)	Role-Physical (0 – 100)	Social Functioning (0 – 100)
0 Forms	52.46%	8.2	7.0	6.9	76.1	14.9	85.8	61.6	80.9	84.9
1 Form	47.54%	7.8	6.5	6.0	71.1	17.0	78.5	57.3	75.7	78.3
2 Forms	7.71%	7.4	6.1	5.2	66.9	19.1	73.2	54.6	73.7	73.1
3 Forms	0.67%	7.0	5.9	4.8	63.8	21.0	67.6	53.0	71.8	68.9
4 Forms	0.02%	6.4	5.5	3.7	60.1	21.3	64.1	52.8	69.7	69.6

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Figure 6.1 Percentage Gap in Wellbeing Between Those Experiencing 0 and 4 Forms of Housing Precariousness, 2001 – 2018.
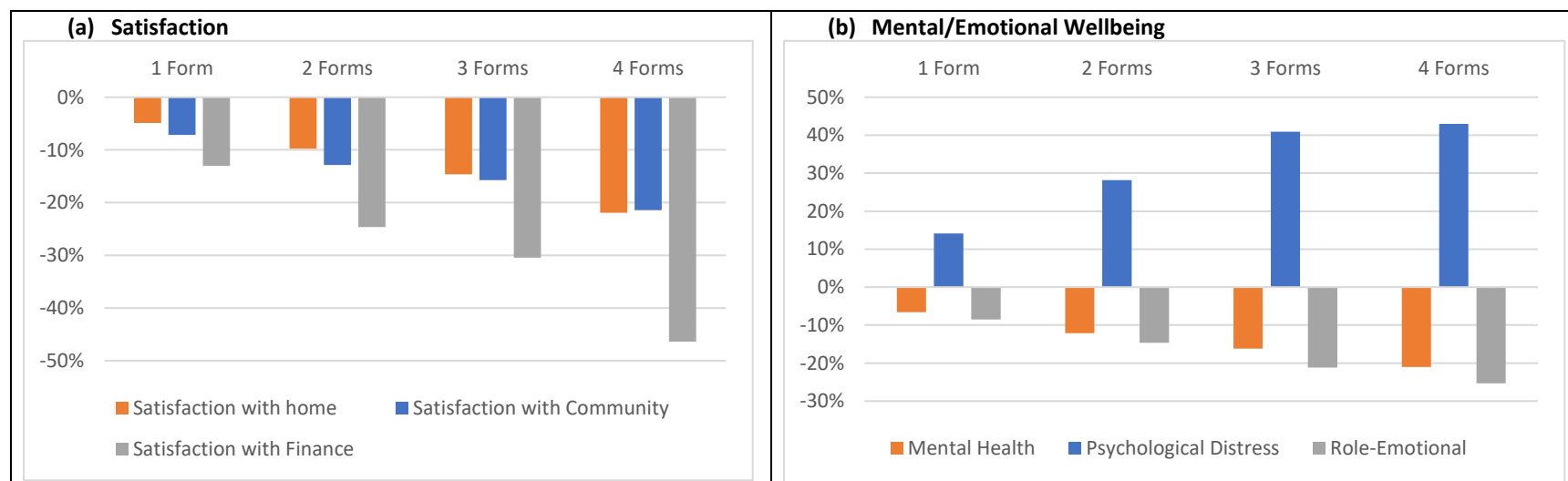
Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Following on from this, table 6.4 presents the mean wellbeing outcome scores by separate precarious housing indicators. This table displays the percentage gap in each wellbeing outcome between those experiencing a form of precarious housing versus those who are not. This is calculated by taking the wellbeing value from the 'No' row and subtracting from the value in the 'Yes' row, being expressed as a percentage of the mean wellbeing score.

Across the different wellbeing outcomes, satisfaction with one's finances and psychological distress are the most significantly impacted across the various housing precariousness factors except for those in the lowest 20th percentile of the SEIFA index. In particular, those who have been forced to move suffered the most with a 20% decline in both financial satisfaction and psychological distress, while those enduring unaffordability also experienced a 20% fall to satisfaction with finances. Uncovering the least significant impacts seen, respondents in overcrowded conditions only dealt with around a 1% fall to their vitality and role-physical scores outcomes while additionally, those forced to move saw no significant change to role-physical scores. It is clear from these estimates that the strength of statistical association between housing precariousness and wellbeing are not uniform across the different precarious housing and wellbeing domains.

Table 6.4: Percentage gap in Mean Wellbeing Scores by Precarious Housing Indicator, 2001 – 2018.

Precarious Housing Indicator		Satisfaction			Mental/Emotional Wellbeing			Physical Wellbeing		Social Wellbeing
		Satisfaction with Home (0 – 10)	Satisfaction with Community (0 – 10)	Satisfaction with Finance (0 – 10)	Mental Health (0 – 100)	Psychological Distress (10 – 50)	Role-Emotional (0 – 100)	Vitality (0 – 100)	Role-Physical (0 – 100)	Social Functioning (0 – 100)
Mean Wellbeing Score 2001 – 2018		8.0	6.7	6.5	73.9	16.0	82.6	59.7	78.6	82.0
Forced Move	Yes	7.3**	6.0**	5.2**	67.2**	19.1**	74.3**	54.5**	77.9	75.2**
	No	8.0	6.8	6.5	74.1	15.9	82.8	59.8	78.6	82.2
% Gap		8.8%	11.9%	**20.0%**	9.3%	**20.0%**	10.3%	8.9%	0.9%	8.5%
Unaffordable 30%	Yes	7.6**	6.3**	5.3**	68.8**	18.2**	74.7**	55.8**	74.7**	75.4**
	No	8.0	6.8	6.6	74.3	15.8	83.3	60.0	78.9	82.5
% Gap		5.0%	7.5%	**20.0%**	7.4%	**15.0%**	10.4%	7.0%	5.3%	8.7%
Overcrowded	Yes	7.3**	6.4**	5.6**	70.0**	18.1**	79.6**	59.0**	79.5*	77.6**
	No	8.0	6.8	6.5	74.0	15.9	82.7	59.7	78.6	82.2
% Gap		8.8%	6.0%	**13.8%**	5.4%	**13.8%**	3.8%	1.2%	1.1%	5.6%
Neighbourhood Crime – Burglary and Theft	Yes	7.7**	6.3**	6.0**	70.5**	17.1**	78.7**	56.7**	76.9**	78.6**
	No	8.1	6.9	6.6	74.9	15.5	83.7	60.6	79.1	83.0
% Gap		5.0%	9.0%	9.2%	6.0%	10.0%	6.1%	6.5%	2.8%	5.4%
Neighbourhood – People being Hostile and Aggressive	Yes	7.6**	6.3**	5.9**	68.4**	17.6**	75.9**	55.9**	75.7**	75.6**
	No	8.0	6.8	6.6	74.7	15.5	83.6	60.3	79.1	82.9
% Gap		5.0%	7.5%	10.8%	8.5%	**13.1%**	9.3%	7.4%	4.3%	8.9%
SEIFA 2011 Decile of Index – 20th percentile	Yes	7.8**	6.5**	6.0**	71.0**	17.4**	76.7**	56.9**	71.2**	76.2**
	No	8.0	6.8	6.6	74.6	16.8	84.0	60.4	80.4	83.4
% Gap		2.5%	4.5%	9.2%	4.9%	3.7%	8.8%	5.9%	11.7%	8.8%

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Note: ** Difference between 'yes' and 'no' statistically significant at the 1% level, *Difference between 'yes' and 'no' statistically significant at the 5% level. Largest percentage gaps are outlined in bold.

6.3.2 Impact of separate Precarious Housing indicators on Wellbeing – Model Set 1

This section unpacks the causal impacts of precarious housing on wellbeing reported in table 6.5 and 6.6. Table 6.5 sets out the magnitude and statistical significance of the model coefficients, while table 6.6 displays the percentage change contribution that each precarious housing indicator makes towards various wellbeing outcomes. This is calculated by taking each precarious housing coefficient and dividing it by the average score of a wellbeing outcome. This result is then multiplied by 100 to convert it to a percentage. It is necessary to convert these coefficient values into percentages as there are different scoring ranges across the wellbeing variables so the coefficients by themselves are not comparable across the models. For instance, satisfaction is scored from 0 – 10, the SF-36 health outcomes are scored 0 – 100, and psychological distress is scored from 10 – 50. The conversion into percentages allows for the magnitude of change to be compared over the different wellbeing outcomes. Additionally, only the percentage changes for the statistically significant coefficients from table 6.5 are displayed in table 6.6.

As described in chapter 4, the model employed is a fixed effects OLS regression that estimates the impact of precarious housing indicators at time t on wellbeing outcomes at time t+1. As indicated earlier, there is a total of nine models within this set, each accounting for one wellbeing outcome. The following paragraphs set out the impact of each precarious housing indicator in turn.

Regarding the overall performance of these set of models, firstly, the significant F-statistic values across all the models are reassuring. They fail to reject the null hypotheses that implies that none of the explanatory variables explain variations in the outcome. Turning to the R-squared values next, which is defined earlier in chapter 5. The satisfaction, mental health and psychological distress models are relatively low with overall R-squared values ranging from 0.030 to 0.078, indicating they explain 3% - 7.8% of the variability within the dependent variable. The role-emotional health, physical wellbeing and social wellbeing indicators however are even lower at 0.0002 to 0.008. It is common when analysing wellbeing models, to have small R-squared statistics. As

discussed in chapter 5, there are other studies that have modelled wellbeing and reported similar R-squared values.

Across the nine wellbeing models, the various precarious housing indicators are found to significantly affect wellbeing outcomes. The impacts range from 0.3% to 1.4%. These, on face value, seems like a minimal amount. However, similar magnitude results are seen in multiple studies that explore changes in wellbeing. For example, Bentley et al. (2011) found that going into unaffordable housing caused a 2.6% decline in the SF-36 mental component summary (MCS) score from the average, the MCS being made up of mental health, role-emotional, vitality and social functioning domains. Moreover, Mallett et al. (2011) found that being forced to move is associated with a 0.6 point reduction in the MCS score, which is recorded on a scale of 0 – 100.

Regarding being forced to move from a dwelling, this caused roughly a 1% decrease to satisfaction with feeling part of the local community and finances. Turning next to unaffordable housing, the model results show that the presence of unaffordability issues reduces financial satisfaction, mental health and role-emotional health by 0.6% to 1.4%. This decline in mental and emotional wellbeing is possibly associated with the increased stress that arises from having high housing costs relative to income, with the lower financial satisfaction also due to this same reason as less economic resources remain available for other necessities after housing costs are paid. The results presented here confirm the adverse effect of unaffordable housing on mental health that has been covered extensively within the literature. Research conducted by Bentley et al. (2011) reported a decrease of 1.19 points (out of a maximum of 100 points) to the SF-36 MCS score for low-to-middle income households changing from affordable to unaffordable housing. A similar magnitude effect was discovered by Baker et al. (2014) who concluded those who are living in unaffordable housing reported a 1.12 point lower MCS score than those in affordable housing.

Overcrowded conditions result in a 1.3% decline in satisfaction with home, which would likely indicate a dissatisfaction with the living space. According to Foye (2017), their analysis provided similar findings that living space has a positive, diminishing marginal effect on housing satisfaction for both genders. Foye (2017) tracked persons over seven

years, measuring the change to their housing satisfaction (on a scale of $1 - 7$) pre-move and several years post-move into a dwelling with increased living space. They found that satisfaction increased by 1 point in the same year as the move, this effect diminishing from a 0.7 point improvement in the first year to around 0.5 points the following three years post-move.

Insecure neighbourhoods also have measurable but small impacts on wellbeing outcomes one year later. Neighbourhood crime in the form of burglary and theft is associated with approximately 0.5% lower satisfaction while encountering hostile and aggressive neighbours leads to small, but significant adverse effects across all the wellbeing outcomes except for role-emotional health ranging from 0.3% to 0.7%. This is supported by Frescoln et al. (2017) and Jones-Rounds et al. (2014) who concluded individuals who reside in safe neighbourhoods reported better health. Specifically, Jones-Rounds et al. (2014) uncovered that if individuals residing in low quality housing relocate to a high quality neighbourhood, their average psychological wellbeing score improves from 23 to around 37, this measure having a total range of $0 - 54$.

Moving onto the effect of neighbourhood disadvantage, represented by the SEIFA index, which is reverse scored for the purposes of this analysis so that a higher score here indicates increased disadvantage. This matches the other precarious housing variables which have a higher score represent worse conditions. The SEIFA index is also divided by 100 within this chapter to make regression results easier to interpret. Higher levels of neighbourhood disadvantage – as proxied by the SEIFA index – leads to around a 1% fall in satisfaction with community and home as well as role-physical scores for every 100 point increase in the index. Conversely, one's financial satisfaction is found to benefit with an increase of 0.4% when residing in more disadvantaged areas. This could possibly be due to those residing in more advantageous or affluent neighbourhoods having to deal with higher housing costs compared to those in more disadvantaged areas.

The control variables shed some light on the differing impacts attributed to different sociodemographic characteristics. Some noteworthy results are as follows. Having children or being separated is associated with 3.1% and 6.5% reduction in financial satisfaction respectively. This could be due to the increased costs that arise with having

children, while those who are separated have to rely on their own income instead of the additional support of their partners when they were married. The impact of marital breakdown on mental and emotional health is clear – separation and divorce lead to a 2.5% to 2.8% lower score compared to those who are married. Public rental status has a 4.8% lower satisfaction with the home they reside in compared to outright homeowners, which is similar to what is reported by the private rental status. This reduced housing satisfaction experienced by private and public renting could be the result of these two tenure groups being limited in the way they can alter their residence compared to those who own their home.

There are a few differences seen by the different age groups, those over 55 benefit from increased mental and emotional wellbeing levels by 3.1% to 6.3% and enjoy a 10.4% improvement to social functioning in comparison to those aged 15 – 24 years when other variables are controlled for. An unexpected result that is also associated with age is that role-physical wellbeing is improved as one gets older, with the increase ranging from 5.1% to 21.2%. The major statistical region and calendar year flag coefficients are reported under appendix B1. The results show that living outside the capital city across the five states or in the NT and ACT are all linked to an 2.4% to 7.1% improvement to satisfaction with feeling part of the local community. This indicates that communities are potentially more close-knit outside the capital cities. Moreover, there is evidence of mental health deteriorating over time by 0.6% to 2.7% from wave 7 onwards.

Overall, while a myriad of causal links can be drawn between different dimensions of precarious housing and wellbeing, the most significant links appear to relate to the satisfaction domain of wellbeing. Firstly, being forced to move is associated with around a 1% drop in community and financial satisfaction. Secondly, unaffordability causes a 1.4% fall in financial satisfaction and lastly, crowded conditions and increased neighbourhood disadvantage leads to a 1.3% worse satisfaction with home score. In all other cases, the links between precarious housing at time *t* and wellbeing one year later are either small (between 0.3% and 0.8%) or statistically insignificant.

The findings have also uncovered that one's satisfaction is the most widely affected by housing precariousness. All forms of precarious housing lower one's financial

satisfaction, while five of the seven forms affected the other two satisfaction measures. Additionally, it is evident that neighbourhood hostility and aggressiveness is the housing precariousness factor that affects the widest range of wellbeing outcomes, impacting every outcome except for role-emotional health.

Table 6.5: Effect of Housing Precariousness at *t* on Wellbeing at *t*+1, fixed effects OLS models, 2001 – 2018.

Predictors	Satisfaction			Mental/Emotional Wellbeing			Physical Wellbeing		Social Wellbeing
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role-Emotional	Vitality	Role-Physical	Social Functioning
Forced Move	0.011	-0.090**	-0.070**	-0.176	0.217	-0.774	0.013	0.162	-0.360
	(0.022)	(0.024)	(0.024)	(0.188)	(0.120)	(0.435)	(0.211)	(0.448)	(0.284)
Unaffordable 30%	-0.028	-0.027	-0.090**	-0.421**	-0.010	-0.667*	-0.232	0.021	0.009
	(0.016)	(0.018)	(0.018)	(0.141)	(0.086)	(0.327)	(0.159)	(0.336)	(0.213)
Overcrowded	-0.106**	0.020	-0.049*	-0.254	-0.089	0.638	-0.006	-0.080	-0.082
	(0.022)	(0.025)	(0.025)	(0.197)	(0.121)	(0.458)	(0.222)	(0.470)	(0.297)
Neighbourhood Crime	-0.030**	-0.032**	-0.019**	-0.040	0.032	-0.060	-0.084	-0.060	-0.029
	(0.005)	(0.006)	(0.006)	(0.046)	(0.028)	(0.107)	(0.052)	(0.110)	(0.069)
Neighbourhood Hostility	-0.044**	-0.042**	-0.022**	-0.189**	0.115**	-0.357	-0.167**	-0.232*	-0.283**
	(0.005)	(0.006)	(0.006)	(0.046)	(0.028)	(0.107)	(0.052)	(0.110)	(0.070)
SEIFA Index – reverse scored	-0.103**	-0.048**	0.024**	0.008	-0.003	-0.197	-0.023	-0.359*	-0.172
	(0.008)	(0.009)	(0.009)	(0.068)	(0.043)	(0.158)	(0.076)	(0.162)	(0.103)
Owner with a mortgage	0.036**	-0.013	-0.070**	0.034	0.041	0.128	-0.217	0.060	-0.175
	(0.013)	(0.014)	(0.014)	(0.110)	(0.071)	(0.254)	(0.124)	(0.262)	(0.166)
Private Renter	-0.269**	-0.137**	-0.142**	-0.038	0.103	-0.417	-0.423**	0.083	-0.273
	(0.016)	(0.018)	(0.018)	(0.141)	(0.090)	(0.326)	(0.158)	(0.335)	(0.212)
Public renter	-0.381**	-0.132**	-0.110**	-0.699*	0.907**	-0.862	-0.331	-0.916	-0.560
	(0.037)	(0.042)	(0.041)	(0.329)	(0.216)	(0.763)	(0.369)	(0.785)	(0.495)
Other tenure type	-0.198**	-0.136**	-0.054	0.050	0.105	-0.624	-0.253	-1.144*	-0.584
	(0.027)	(0.030)	(0.030)	(0.236)	(0.147)	(0.546)	(0.265)	(0.561)	(0.355)
Dependent children	-0.137**	0.050**	-0.202**	-0.798**	0.162**	-0.420	-1.761**	0.858**	-0.160
	(0.014)	(0.015)	(0.015)	(0.118)	(0.075)	(0.271)	(0.132)	(0.279)	(0.177)
De facto	0.095**	-0.084**	0.044*	0.570**	-0.050	-0.019	1.165**	0.148	0.263
	(0.019)	(0.022)	(0.021)	(0.166)	(0.105)	(0.383)	(0.186)	(0.394)	(0.250)
Separated	-0.093**	-0.111**	-0.427**	0.185	0.421**	-2.333**	1.358**	-0.789	-0.254
	(0.029)	(0.032)	(0.032)	(0.249)	(0.160)	(0.576)	(0.279)	(0.592)	(0.375)
Divorced	0.048	-0.036	-0.242**	1.882**	-0.380*	0.117	2.282**	-0.090	1.455**
	(0.029)	(0.033)	(0.032)	(0.251)	(0.166)	(0.582)	(0.282)	(0.599)	(0.379)
Widowed	-0.084*	-0.120**	-0.059	1.159**	-0.563**	-0.193	0.389	-2.715**	-0.118
	(0.035)	(0.039)	(0.038)	(0.295)	(0.197)	(0.689)	(0.331)	(0.708)	(0.442)
Single not married	0.165**	-0.074**	-0.116**	0.158	0.163	-1.540**	1.838**	-0.446	-0.942**
	(0.024)	(0.027)	(0.027)	(0.211)	(0.135)	(0.488)	(0.237)	(0.501)	(0.319)
Age 25 - 34	-0.098**	0.123**	0.022	-0.042	0.018	1.516**	0.710**	3.969**	2.223**
	(0.021)	(0.023)	(0.023)	(0.180)	(0.109)	(0.414)	(0.202)	(0.426)	(0.271)

	Satisfaction			Mental/Emotional Wellbeing			Physical Wellbeing		Social Wellbeing
Predictors	**Satisfaction with home**	**Satisfaction with community**	**Satisfaction with finance**	**Mental health**	**Psychological distress**	**Role-Emotional**	**Vitality**	**Role-Physical**	**Social Functioning**
Age 35 - 44	0.029	0.305**	-0.037	0.273	-0.069	4.192**	2.276**	8.943**	4.900**
	(0.030)	(0.033)	(0.033)	(0.258)	(0.162)	(0.595)	(0.289)	(0.612)	(0.389)
Age 45 - 54	0.147**	0.343**	-0.091*	0.988**	-0.058	6.818**	4.178**	12.436**	6.676**
	(0.038)	(0.042)	(0.041)	(0.322)	(0.201)	(0.744)	(0.362)	(0.766)	(0.486)
Age 55 - 64	0.236**	0.421**	-0.034	2.378**	-0.499*	10.370**	6.244**	15.210**	8.609**
	(0.046)	(0.051)	(0.051)	(0.392)	(0.241)	(0.905)	(0.440)	(0.931)	(0.590)
Age 65+	0.266**	0.537**	0.131*	3.669**	-1.099**	12.466**	7.789**	16.563**	9.878**
	(0.055)	(0.062)	(0.061)	(0.470)	(0.285)	(1.088)	(0.528)	(1.119)	(0.708)
Has long-term health condition	-0.029**	-0.045**	-0.067**	-1.210**	0.489**	-2.966**	-1.993**	-5.062**	-2.594**
	(0.011)	(0.012)	(0.012)	(0.090)	(0.057)	(0.209)	(0.101)	(0.215)	(0.136)
Low-income	-0.023*	0.005	-0.137**	-0.193*	0.073	-0.581**	-0.206*	-0.639**	-0.214
	(0.011)	(0.012)	(0.012)	(0.092)	(0.058)	(0.213)	(0.103)	(0.219)	(0.139)
R-Squared	0.072	0.053	0.078	0.030	0.062	0.005	0.008	0.000	0.004
Constant	8.284**	6.622**	6.350**	73.936**	15.774**	82.656**	60.547**	81.206**	82.694**
F-Stat	33.67**	23.86**	74.26**	12.07**	7.32**	21.75**	43.21**	64.93**	32.28**
N	196,353	196,186	196,366	182,949	70,687	181,044	182,972	181,196	183,859

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Notes: ** $p < 0.01$, * $p < 0.05$. The reference categories are outright owner, legally married, age 15-24 years, does not have long term health condition, high-income. Standard errors are reported in parentheses. Education, employment, region and wave coefficients are reported in Appendix B1.

Table 6.6: Effect of Housing Precariousness on Respondents Wellbeing – percentage change, 2001 – 2018.

Predictors	Satisfaction			Mental / emotional Wellbeing			Physical Wellbeing		Social Wellbeing
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role-Emotional	Vitality	Role-Physical	Social Functioning
Forced Move		**-1.3%**	**-1.1%**						
Unaffordable 30%			**-1.4%**	-0.6%		**-0.8%**			
Overcrowded	**-1.3%**		**-0.8%**						
Neighbourhood Crime	-0.4%	-0.5%	-0.3%						
Neighbourhood Hostility	-0.6%	-0.6%	-0.3%	-0.3%	0.7%		-0.3%	-0.3%	-0.3%
SEIFA Index – reverse scored	**-1.3%**	-0.7%	0.4%					-0.5%	

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Note: Standard errors are reported in parentheses. This table displays the percentage change the precarious housing indicator has on the average wellbeing score. This is calculated by taking the coefficient, dividing this by the average score of the wellbeing outcome, this result is then multiplied by 100 to get a percentage. Only statistically significant results at the 1% and 5% level are reported in this table. The bold and shaded cells represent some of the most significant relationships.

6.3.3 Impact of separate Wellbeing outcomes on Precarious Housing – Model Set 2

Next, the reverse relationship is examined i.e. the causal impacts of wellbeing on precarious housing. The model findings are displayed in table 6.7, documenting the effect that each wellbeing indicator at time t has on respondents' experience of housing precariousness at $t+1$.

As explained previously, where a precarious housing indicator is binary in nature, a logit model is applied. Where the precarious housing indicator is continuous in nature, an OLS model is applied. In all cases, a fixed effects specification is used. Logistic regression is therefore executed for the forced move, unaffordability and overcrowded models due to the binary nature of these outcomes. There is a large drop in observations for these four precarious housing outcomes because the fixed effects specification of the logit model drops individuals with no variation in these outcomes over the data time frame. The observations fell from 230,830 to between 27,449 and 60,012, a 67.9% to 74% reduction in sample size. For example, those reporting they were overcrowded in every wave they were observed would have been dropped from the overcrowded model. This is also the case for persons who recorded having never been in an overcrowded welling across waves, leaving only those who made a transition between overcrowding and non-crowded conditions during the timeframe. The insecure neighbourhood indicators of crime, hostility and SEIFA are still continuous variables, so OLS is deployed for these dependent variables with no loss of sample.

The SF-36 wellbeing variables of mental health, role-emotional, vitality, role-physical and social functioning are all converted from a score of $0 - 100$ to a score of $0 - 10$ to match the satisfaction values and provide more comparable results interpretation across the continuous dependent variables. The psychological distress variable is omitted from this set of models as the number of observations available for modelling is significantly reduced. This is due to this variable only being observed in every second wave from wave 7 onwards.

A total of seven models are present in this set, each covering one precarious housing indicator. In table 6.8, only the odds ratio are reported for the logit models and the percentage changes for the OLS models, with only the significant coefficients being

displayed. The percentage changes for these values in table 6.8 are calculated using the same approach as in table 6.6. The following paragraphs set out the effect of each wellbeing outcome in succession.

Touching on model performance before shedding light on more detailed findings, all the chi-squared values in the logit models are statistically significant while pseudo R-squared ranged from 0.037 to 0.264 for the logit models. Even though these pseudo R-squared values are relatively small just like the R-squared values in the previous section. According to Brooks (2014), small pseudo R-squared values are often seen when dealing with limited dependent variable models (logit models) such as what is used in this analysis. The OLS models reported significant F-statistics, which as mentioned in the previous section, is a strong start in indicating how well the model performs overall. The R-squared values range from 0.054 to 0.159, which represents the variability in the insecure neighbourhood models being explained by 5.4% to 15.9%.

A general trend is evident where the higher one's level of wellbeing, the lower the likelihood of them experiencing precarious housing. Firstly, uncovering the effect of wellbeing on being forced to move from your residence. Higher levels of satisfaction with finance or home are associated with a lower likelihood of experiencing this by 2.1% or 9.8% respectively. Furthermore, these findings potentially show that dissatisfaction with various life outcomes can drive tenure insecurity. In particular, low financial satisfaction results in one being constantly trapped in an insecure tenure situation as it generally indicates a low amount of economic resources available, therefore being constantly forced to move around. Wellbeing outcomes other than satisfaction have a weaker effect on being forced to move.

Unpacking the likelihood of suffering from unaffordability next, satisfaction with community and finances reduce this chance significantly by 1.5% to 6.2%. Benefiting from higher financial satisfaction could represent an individual possessing greater economic resources, therefore reducing the chance of having housing costs take up a significant portion of available income.

Living in overcrowded conditions is unveiled to be influenced by satisfaction with home and finances, lowering the odds of experiencing this precarious housing aspect by 2.2%

to 6.3% while being widowed or single, not married is associated with a 2.2 and 2.4 times higher likelihood of crowded housing conditions. Increased financial satisfaction lowering the odds of residing in an overcrowded household potentially indicates that those with reduced economic resources are only able to afford to live with many others in the one household.

The effect wellbeing has on neighbourhood insecurity is uncovered next, the impacts seen here being quite small relative to the other precarious housing dimensions. Higher levels of satisfaction with the home is a benefit as it decreases the likelihood of facing neighbourhood hostility and crime by around 1%, community satisfaction having a similar magnitude effect on hostility. In addition, improved mental health levels appear to significantly affect the chance of enduring insecure neighbourhoods. Decreasing the chance of suffering from crime and hostility by 0.4% and 0.8% respectively for every 10-point increase in mental health. Regarding neighbourhood disadvantage, as indicated by the SEIFA index ranking, wellbeing had relatively little effect.

Moving onto the effect of the various controls on suffering from housing precariousness. Marital status is found to significantly increase the chance of encountering unaffordability. Being separated, divorced, widowed and single, not married has a 1.4 to 2.2 times increased odds. As expected, part-time employment, unemployment or not being in the labour force leads to a 1.8 to 2.8 times greater chance of suffering from unaffordable housing compared to full-time employees. This shows that precarious employment or a lack of employment strongly drives unaffordability.

There is also evidence of unaffordability generally increasing over time after controlling for other variables. There is a 1.2 higher chance in 2005 rising to a 1.6 times higher chance in 2017 as seen in appendix B2, which presents the calendar year flag coefficients and the major statistical region coefficients. Moreover, residing in a public rental resulted in a significant increase of 7.3% to 9.5% in experiencing neighbourhood crime, hostility and relative disadvantage.

Table 6.7: Effect of Wellbeing at *t* on Experiencing Precarious Housing at *t*+1, fixed effects logit and OLS model, 2001 – 2018.

	Logit							OLS		
	Tenure Insecurity		Unaffordable Housing		Unsuitable Housing			Insecure Neighbourhoods		
Predictors	Forced Move	OR	Unaffordable 30%	OR	Overcrowded	OR		Crime	Hostility	SEIFA – reverse scored
Satisfaction with Home	-0.103** (0.008)	0.902	0.000 (0.007)	1.000	-0.065** (0.010)	0.937		-0.021** (0.001)	-0.024** (0.001)	-0.012** (0.001)
Satisfaction with Community	-0.004 (0.009)	0.996	-0.015* (0.006)	0.985	0.001 (0.010)	1.001		-0.013** (0.001)	-0.014** (0.001)	-0.002** (0.001)
Satisfaction with Finance	-0.022* (0.009)	0.979	-0.064** (0.007)	0.938	-0.023* (0.010)	0.978		-0.001 (0.001)	0.000 (0.001)	0.003** (0.001)
Mental Health	-0.027 (0.017)	0.973	-0.018 (0.012)	0.982	-0.006 (0.018)	0.994		-0.009** (0.002)	-0.016** (0.002)	0.004** (0.001)
Role-Emotional	-0.008 (0.006)	0.992	0.003 (0.005)	1.003	-0.004 (0.007)	0.996		0.001 (0.001)	0.001 (0.001)	-0.001* (0.000)
Vitality	-0.024 (0.015)	0.976	0.008 (0.011)	1.008	0.005 (0.016)	1.005		0.000 (0.002)	-0.003 (0.002)	-0.003** (0.001)
Role-Physical	0.017** (0.007)	1.017	-0.003 (0.005)	0.997	-0.019** (0.007)	0.981		-0.001 (0.001)	0.000 (0.001)	0.000 (0.000)
Social Functioning	-0.001 (0.011)	0.999	-0.013 (0.008)	0.987	0.008 (0.013)	1.008		-0.003* (0.001)	-0.005** (0.001)	0.000 (0.001)
Owner with a mortgage	-0.160 (0.092)	0.852	0.762** (0.051)	2.142	-0.376** (0.070)	0.687		0.000 (0.006)	-0.011 (0.006)	0.006 (0.004)
Private Renter	1.239** (0.083)	3.452	0.983** (0.052)	2.673	-0.330** (0.078)	0.719		0.043** (0.008)	0.021** (0.008)	-0.015** (0.005)
Public renter	-0.079 (0.148)	0.924	-0.080 (0.104)	0.923	-0.360** (0.124)	0.698		0.182** (0.019)	0.188** (0.019)	0.210** (0.012)
Other tenure type	1.162** (0.117)	3.198	0.455** (0.092)	1.577	-0.107 (0.119)	0.898		-0.002 (0.014)	0.000 (0.014)	-0.031** (0.009)
Dependent children	-0.126* (0.060)	0.882	0.275** (0.045)	1.317	0.501** (0.070)	1.651		-0.001 (0.007)	-0.035** (0.007)	-0.029** (0.004)
Age 25 - 34	-0.260** (0.071)	0.771	-0.206** (0.057)	0.814	-0.538** (0.093)	0.584		0.085** (0.010)	0.005 (0.010)	-0.017** (0.006)
Age 35 - 44	-0.578** (0.122)	0.561	-0.513** (0.091)	0.599	-0.238 (0.144)	0.788		0.083** (0.015)	0.010 (0.015)	-0.086** (0.009)
Age 45 - 54	-0.721** (0.173)	0.486	-0.701** (0.123)	0.496	-0.232 (0.190)	0.793		0.099** (0.019)	0.031 (0.018)	-0.114** (0.012)

| Predictors | Logit | | | | | | | OLS | | |
| | Tenure Insecurity | | Unaffordable Housing | | Unsuitable Housing | | | Insecure Neighbourhoods | | |
	Forced Move	OR	Unaffordable 30%	OR	Overcrowded	OR		Crime	Hostility	SEIFA – reverse scored
Age 55 - 64	-0.904** (0.233)	**0.405**	-0.955** (0.159)	**0.385**	-0.450 (0.248)	**0.637**		0.075** (0.023)	0.022 (0.022)	-0.096** (0.014)
Age 65+	-0.908** (0.316)	**0.403**	-1.111** (0.201)	**0.329**	-0.796* (0.334)	**0.451**		0.009 (0.028)	-0.003 (0.027)	-0.072** (0.017)
Part-Time	-0.032 (0.052)	**0.968**	0.598** (0.039)	**1.819**	0.156* (0.061)	**1.168**		-0.018** (0.006)	-0.021** (0.006)	0.002 (0.004)
Unemployed	-0.077 (0.075)	**0.926**	1.025** (0.054)	**2.787**	0.219** (0.082)	**1.244**		-0.019 (0.011)	-0.007 (0.011)	0.025** (0.007)
Not in the labour force	-0.172** (0.063)	**0.842**	0.979** (0.044)	**2.662**	0.110 (0.068)	**1.116**		-0.058** (0.007)	-0.048** (0.007)	0.011* (0.004)
Low-income	0.007 (0.042)	**1.007**	0.389 (0.027)	**1.475**	-0.013 (0.047)	**0.987**		0.002 (0.005)	0.006 (0.005)	0.028 (0.003)
Chi-Square	1654.31**		2547.48**		648.40**		R-Squared	0.054	0.058	0.159
Pseudo R^2	0.078		0.061		0.037		Constant	2.988**	2.642**	2.163**
N	37,972		60,012		27,449		F-Stat	61.71**	35.76**	90.67**
							N	192,413	199.813	204,893

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Notes: ** $p < 0.01$, * $p < 0.05$. The reference categories are outright owner, age 15-24 years, full-time employed and high-income. Standard errors are reported in parentheses. Marital status, long term health condition, education, region and wave coefficients are reported in Appendix C1.

Table 6.8: Effect of Wellbeing at *t* on Experiencing Precarious Housing at *t*+1, odds ratios for logit models and percentage change for OLS models, 2001 – 2018.

	Tenure Insecurity	Unaffordable Housing	Unsuitable Housing	Insecure Neighbourhoods		
Predictors	Forced Move OR	Unaffordable 30% OR	Overcrowded OR	Crime	Hostility	SEIFA – reverse scored
Satisfaction with Home	**0.902**		**0.937**	**-0.8%**	**-1.1%**	-0.5%
Satisfaction with Community		**0.985**		-0.5%	-0.7%	-0.1%
Satisfaction with Finance	**0.979**	**0.938**	0.978			0.1%
Mental Health				-0.4%	**-0.8%**	0.2%
Role-Emotional						-0.05%
Vitality						-0.1%
Role-Physical	**1.017**		**0.981**			
Social Functioning				-0.1%	-0.2%	

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Note: Standard errors are reported in parentheses. This table displays the odds ratio for the logit model results and the percentage change for the OLS model results. The percentage change for the OLS results is calculated by taking the coefficient and dividing it by the average score of precarious housing indicator, this result is then multiplied by 100 to get a percentage. Only statistically significant results at the 1% and 5% level are reported in this table

6.4 Chapter Summary

This chapter addresses the thesis' second research question of which dimensions of housing precariousness have the largest impact on the wellbeing of Australian adults and vice versa. Overall, the results presented in this chapter highlight the detrimental effect that separate housing precariousness dimensions have on the different wellbeing outcomes. As explained in section 6.3, the findings on forced move in this chapter are going to differ from the results on forced moves in chapter 5 due to wellbeing being measured at time t in chapter 5 and t+1 here. Specifically, forced move appears to have a milder impact when wellbeing is measured at t+1 instead of t. This could potentially be due to individuals recovering from the shock of the forced move between time t and t+1 and adapting to their situation, returning to their baseline level of wellbeing after a period of time (Diener et al. 1999).

It is clear that some forms of housing precariousness have stronger influences on wellbeing than others. The most significant impacts seen by the satisfaction aspects of wellbeing. Being forced to move leads to a 1% fall in community and financial satisfaction. Unaffordability results in a 1.4% decrease to financial satisfaction while crowded conditions and high levels of relative disadvantage leads to 1.3% worse home satisfaction. Furthermore, the neighbourhood insecurity effects on wellbeing are relatively weaker than the rest of the housing precariousness domains. The compounding negative effect that each additional form of housing precariousness has on the wellbeing of respondents is also uncovered and deserves further investigation.

An investigation of the influence of wellbeing on housing precariousness highlights the three satisfaction measures as having the greatest influence on precarious housing experiences. Specifically, home and financial satisfaction were the most important drivers of housing precariousness. The financial satisfaction measure could potentially be measuring the experience of low economic resources that is not adequately captured by the low-income status variable in the model. Moreover, the remaining wellbeing outcomes have little impact on an individual experiencing housing precariousness.

The next chapter, covering the last major piece of analysis in this thesis, will offer some approaches for measuring overall housing precariousness and wellbeing. Followed by

uncovering the effect of precarious housing on overall wellbeing as well as the effect of wellbeing on overall housing precariousness. Afterwards, the factors that affect both these concepts are examined. This analysis is conducted by deploying a PCA methodology to generate the housing precariousness and wellbeing indices. A OLS regression is employed to estimate the impacts to overall wellbeing and precarious housing. An EFA is then applied to examine which variables affect the latent constructs of precarious housing and wellbeing.

Chapter 7 – Overall Housing Precariousness and Wellbeing

7.1 Introduction

Following on from the previous chapter where the relationships between separate precarious housing indicators and separate wellbeing outcomes were examined, this chapter combines these separate factors into indices. The indices are then used to address the third key research question as follows:

How is overall wellbeing affected by housing precariousness and how is overall housing precariousness affected by wellbeing? What are the factors that affect both overall housing precariousness and wellbeing?

This chapter aims to expand the knowledge base by generating a precarious housing index and wellbeing index via the use of PCA, which was described earlier in section 4.9. This method allows for all the separate housing precariousness factors to be combined into one measure. This process is then repeated for the wellbeing indicators. Next, the statistical links between overall housing precariousness and overall wellbeing are explored. This is then followed by investigating the impact of precarious housing on overall wellbeing and the impacts of wellbeing on overall housing precariousness.

An EFA (see section 4.10) is then performed to investigate the latent nature of precarious housing and wellbeing separately. An EFA is also performed on these two latent variables combined. The goal of the EFA is to examine which housing precariousness variables used in this thesis explain the variance in the latent construct and to what extent. This analysis is then repeated for wellbeing. On top of this, all the precarious housing and wellbeing variables are combined to evaluate if they can explain the variance in the two latent constructs together.

The remaining sections of this chapter are organised as follows. Section 7.2 covers the methodology behind other precarious housing indices within the literature. Section 7.3 describes and justifies the variables included in our precarious housing index, followed by the contribution to the literature. Section 7.4 describes the methodology surrounding existing wellbeing indices from the wider literature. Section 7.5 describes and justifies the wellbeing variables incorporated into our wellbeing index, as well as the contribution

it will make to the existing knowledge base. The PCA findings are then presented in section 7.6, describing the details of the precarious housing and wellbeing indices. Statistical links are also uncovered between precarious housing and overall wellbeing, explaining how both indices change over time for different sociodemographic groups. This section then moves onto covering the regression findings outlining the effect of precarious housing on overall wellbeing, and then the effect of wellbeing on overall housing precariousness followed by the EFA results. Section 7.7 then summarises the whole chapter.

7.2 Housing Precariousness Indices in the Existing Literature

Several indexes within the literature have been developed to measure the combined impact of a range of housing precariousness factors on wellbeing. These housing precariousness indices aim to capture various different variables into one score, which is easier to analyse than examining multiple separate indicators while also measuring the effect an accumulation of these indicators have on the lives of individuals (Baker et al. 2017). The construction of these indices varies depending on the type of factors in the index, the method of selecting and combining of the components, the application of weights to the index components and the scoring range (see table 7.1).

The "Index of Housing Insults" is constructed by Baker et al. (2017) to capture the impacts of accumulated negative housing conditions on health. This index is made up of the following components – affordability, security, quality of dwelling, quality of residential area and access to services and support. PCA (see section 4.9) is used to generate the weights for this index. The index is normalized through a series of steps to have a scoring range of 0 – 100, with a higher index score here representing worse housing conditions.

Several other authors construct their indices using a composite index method, which the OECD (2008) describes as a set of variables being summed together using equal weights. Firstly, Baker et al. (2019) builds on Baker et al.'s (2017) index by using it as a base for developing the "Australian Index of Unhealthy Housing", using a composite index

methodology. The index consists of the following domains – affordability, security, quality, residential location and accessibility. To construct the weights, the authors used coefficients generated from a linear regression on data from the Australian Survey of Housing and Wellbeing, where the index of housing insults is modelled as a function of a series of unspecified independent variables. This index is then normalized to a range of 0-100, with a lower score representing healthier housing.

Secondly, Beer et al. (2019) develops the "Index of Relative Homelessness Risk" to capture the affordability and security of housing, featuring five components – cash flow, number of residential moves, evictions, low-income and housing costs. The index also utilises a composite index method as seen in Baker et al.'s (2019) study. After the five components are equally weighted, this results in a score of 2 – 30. This score is then rescaled to an index that ranges from 1 – 10, with 1 indicating low risk and 10 indicating high risk.

Thirdly, there is the "Neighbourhood Deprivation Index" which Jivraj et al. (2019) uses, otherwise known as the Townsend Deprivation Index, but is originally developed by Townsend et al. (1989). The Townsend deprivation index consists of the following four components – no car access, no home ownership, unemployment and overcrowding. To generate a score, the mean of the summed standardised scores from these four components are used, with no clear weighting method defined. A scoring range is also not clearly described. However a higher score in this index indicates greater levels of deprivation experienced.

A series of other studies apply other methods for combining the components into an index. Clair et al. (2019) generates the "Housing Precariousness Index" using a simple method of summing the separate dimensions together. There are four different components of the index consisting of security, affordability, quality and facilities, and access to services. Each component is given equal weighting, with the individual components being recoded to a range of 0 – 1 to indicate precariousness in that area. This leads to an overall index score ranging from 0 – 4, with a higher score indicating higher levels of precariousness.

The "Housing Deprivation Index" which Navarro et al. (2010) generates, uses a different methodology to the previously mentioned studies – a latent variable model to test how living in housing with deficiencies can negatively impact health. A latent variable model can be described as a dimensionality reduction method similar to PCA, allowing researchers to combine a set of partial indicators from the same phenomenon into a single index. This method provides a way of testing if the chosen indicators are measuring this same phenomenon. The different housing condition factors used to populate the index include structural problems, environmental problems, central heating problems and space problems. The different components uses discrimination coefficients as weights, with each being scored as a binary 0 or 1. A higher index score indicates greater levels of housing deprivation.

Table 7.1 below summarises the different housing precariousness indices outlined, presenting the methodology of construction, the components within the index, there weighting method and the scoring range.

Table 7.1: Summary of Different Housing Precariousness Indices from the Existing Literature

Reference	Method	Components in index	Weighting Method	Scoring range
Baker et al. (2017)	Principal Component Analysis	- Affordability - Security - Quality of Dwelling - Quality of Residential Area - Access to services and support	Weighted equally	Normalized to a range of 0 – 100.
Baker et al. (2019)	Composite Index Method.	- Affordability - Security - Quality - Residential Location - Accessibility	Weighted using coefficients from a linear regression model.	Normalized to a range of 0 – 100.
Beer et al. (2019)	Composite Index method.	- Cash Flow - Number of Residential Moves - Evictions - Low-Income - Housing Costs	Weighted equally	Score of 2 – 30 rescaled to 1 – 10.
Jivraj et al. (2019)	Composite Index Method.	- No car access - Non Home Ownership - Unemployment - Overcrowding	Not clearly defined	Not clearly defined
Clair et al. (2019)	Simple Method - dimensions summed together.	- Security - Affordability - Quality/Facilities - Access to Services	Weighted equally	Scored 0 – 4.
Navarro et al. (2010)	Latent Variable Model.	- Hot Running Water - Heating - Leaky Roof - Damp - Rot in Window/Frames/Floor - Overcrowding	Weighted using discrimination coefficients	Each component is scored binary (0, 1).

7.3 Construction of the Housing Precariousness Index in this Thesis

This section sets out and justifies the variables included in the precarious housing index, followed by the contribution of this index to the literature.

The housing precariousness index is derived from the precarious housing variables described and justified back in section 4.3. All of the variables are included in the analysis, with the decision on the final combination based on the PCA results. The aim is to ensure all four aspects of housing precariousness are present in the index – tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods.

To represent tenure insecurity, the forced move variable (see section 4.3.1) is included in the index. Even though the private renter variable is regarded as an important aspect of tenure insecurity within the literature and chapters 5 and 6 of this thesis, the decision is made to omit it from the final index after modelling found that removing it improved the index overall. This could be potentially due to heterogeneity among private renters in Australia. While being a private renter is typically linked to a heightened prospect of experiencing precarious housing issues such as tenure insecurity and unaffordability, some private renters may never encounter any of these precarious housing circumstances in their lifetime. A minority of the population consider private renting as a lifestyle choice, providing freedom, mobility and flexibility compared to homeowners, which is viewed as desirable for some (Productivity Commission 2019; Quigley 2002).

The remaining housing precariousness indicators of unaffordable housing, overcrowding and insecure neighbourhoods which are described in section 4.3.2 to 4.3.4 are incorporated into the index. One change made for the index however, the version of the SEIFA index that splits the scoring into 10 different deciles is incorporated into the construction of the housing precariousness index instead of the normal SEIFA index. This is because the decile version of SEIFA provides better model performances than the normal SEIFA index. The deciles for this index are reverse scored to follow the same scoring pattern as the other variables in the precariousness index, where a higher score indicates increased levels of precariousness.

The precarious housing index derived via PCA in this thesis aims to fill a gap in the literature in several ways. Firstly, this new index includes a larger range of precariousness dimensions than previous studies by amalgamating the four dimensions of tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods. These components will improve on the index Beer et al. (2019) constructs by examining insecure neighbourhoods and unsuitability; Clair et al. (2019) by analysing insecure neighbourhoods; Navarro et al. (2010) and Jivraj et al. (2019) by investigating tenure insecurity, affordability and insecure neighbourhoods.

Secondly, it builds on the index of housing insults by Baker et al. (2017). This is achieved by adding weights to each of the index components which are based on the values generated from the PCA. The index of housing insults and the indices generated by Beer et al. (2019), Jivraj et al. (2019) and Clair et al. (2019) weighted each component equally. Allocating a different weight to each index component is more robust because it allows for the stronger components to reflect their relative importance compared to the weaker ones. Using equal weighting could lead to weaker components influencing the overall score more than they should. (OECD 2008). However, this is not necessarily always the case and when calculating weights, they could still be very similar in value compared to if one was to apply equal weights. In this thesis, even though the newly generated index is weighted, only component 1 is weighted stronger than the others. Components 2, 3 and 4 are still similar in weight, as seen further on this chapter in table 7.7. As such, any policy that aims to address precarious housing should focus on the factors that make up the first component, as they provide the greatest influence to overall housing precariousness.

Lastly, the index developed in this thesis draws on 226,030 observations from an Australian-wide sample, which is significantly greater and more nationally representative than the sample of 1,008 observations Baker et al. (2017) gathered from a South Australian study. Thus, this thesis provides more nationally generalizable insights on the level of overall housing precariousness in Australia.

7.4 Wellbeing Indices in the Existing Literature

There are various wellbeing indexes in the existing international literature which combine different measures to give an indicator of overall wellbeing in individuals. All of these are summarised in table 7.2.

The "Australian Unity Wellbeing Index" (AUWI) is generated using PCA to measure subjective wellbeing. The index is split into two different sub-scales – personal wellbeing and national wellbeing, essentially measuring how satisfied one is with various aspects of their life. The personal wellbeing sub-scale consisted of the following seven components – satisfaction with standard of living, health, what you have achieved in life, personal relationships, how safe you feel, community connectedness and future security. The national wellbeing sub-scale contained three components – satisfaction with the country's economic situation, the state of the environment and social conditions. To calculate the scoring for both sub-scales, the average of the mean scores in each component gives the overall index score, with no clear weighting method being described. The scoring range is 0 – 100, with a higher index score indicating better wellbeing (Cummins et al. 2003).

The OECD generates a framework for measuring wellbeing and progress across countries which focusing not just on current wellbeing, but also resources for future wellbeing. Current wellbeing contains the following dimensions – health status, work life balance, education and skills, social connections, civic engagement and governance, environmental quality, personal security, subjective wellbeing, income and wealth, jobs and earnings as well as housing. The future wellbeing component consists of natural capital, human capital, economic capital and social capital. There is again no clear method of weighting described for this index, with each component being rated on a scale of 0 to 10, a higher score indicating better conditions in that country (OECD n.d.a).

The United Nations Development Programme (UNDP) generate the Human Development Index (HDI) to assess how a country is developing, with emphasis being put on individuals and their capabilities, not just economic factors by themselves. The idea is to question how two countries with similar gross national income possess vastly different development outcomes. The HDI is derived by calculating the geometric mean

of normalized indices, which is then aggregated into a composite index. The HDI consists of three dimensions – a long healthy life, assessed using life expectancy at birth. Being knowledgeable, represented by mean years of schooling for those aged 25 or older and expected years of schooling for children. Lastly, having a decent standard of living which is measured by gross national income per capita. There are no clear weighting methods outlined, with the scoring range of this index being converted to four different categories, each representing different levels of human development. A score below 0.550 indicates low levels of human development, a score between 0.550 and 0.699 medium levels, a score from 0.700 to 0.799 high levels and scores over 0.800 show very high levels (UNDP n.d; UNDP 2019).

In order to provide a complete view of national wellbeing in Australia, the Australian National Development Index (ANDI) is in development. This index utilises a composite index methodology to provide a holistic measure of national progress and wellbeing, the aim being to reflect the factors that matter to Australians. There are twelve different domains of health, economic, social and environmental factors that make up this index. The specific domains include – children and young people's wellbeing, community and regional life, culture, recreation and leisure, governance and democracy, economic life and prosperity, education, knowledge and creativity, environment and sustainability, justice, fairness and human rights, health, indigenous wellbeing, work and work-life balance and subjective wellbeing and life satisfaction. Currently, only prototypes have been made for the health and education domains as the index is still a work in progress as of writing. As such, the weighting, scoring range and meaning of scores have not been published (ANDI n.d.a; ANDI n.d.b).

An additional wellbeing index of note is the "Canadian Index of Wellbeing" (CIW), which aims to examine all the different economic, social, health and environmental indicators that contribute to the general population's wellbeing and overall quality of life. The CIW employs a composite index method. It consists of eight indicators for each of the eight domains, resulting in 64 different indicators being collapsed into a single index average score (CIW n.d; Michalos et al. 2011).

The eight components that compose the CIW include healthy populations, living standards, education, time use, leisure and culture, environment, community vitality and democratic engagement. Each of these domains involve equal weights, with the average score of the eight different components determining the overall score of the CIW. The scoring then calculates the percentage change in the different components, with 1994 being the baseline year. The idea is that the CIW measures the percentage change across the years of the eight domains, with the overall index score being the average variation of all the components. Values of the components and the overall index start at 100, with increases to this indicating improvement to wellbeing and decreases representing declines in wellbeing. For example, the CIW in 1994 is set at the base value of 100 while the score in 2008 is recorded at 111.1, which indicates an overall 11.1% increase in wellbeing in this time period (CIW n.d; Michalos et al. 2011).

The New Economics Foundation (NEF) in England provide a handbook to practitioners on how to measure wellbeing, suggesting three different measures to be used simultaneously. These three measures are the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS), Office for National Statistics (ONS) Subjective Wellbeing questions and a question on social trust. There is no method of weighting mentioned while the scoring range varied between the three different measures. The SWEMWBS asks the participant about their feelings and thoughts on a range of aspects such as feeling relaxed or feeling useful, with the response choices being none of the time, rarely, some of the time, often or all the time. The ONS questions the participants about how they are feeling, for example, asking how satisfied they are with life or asking how anxious they felt yesterday. The scoring for this is from 0 to 10, with a higher score representing better feelings. Lastly, the question on social trust is also scored from 0 to 10, a score of 10 here indicating most people can be trusted (NEF 2012).

The health utilities index – Mark III is constructed by Feeny et al. (1995), which is the third version of the measure that is available. This index is regarded as measuring objective wellbeing, as it is based on tests and observations instead of self-reported like subjective wellbeing is. Its original purpose is to assess the health status of those that survived childhood cancer, but it has since been refined to measure the health of the

population. This index is constructed using a multi-attribute health status classification system method and consists of the following components, vision, hearing, speech, ambulation, dexterity, emotion, cognition and pain. Feeney et al. (1995) did not specify any weighting method for this index, while each dimension is scored from either 1 to 5 or 1 to 6. Higher scores amongst the different domains indicate worse off conditions, while lower scores represent better functioning. For example, a score of 1 in the speech category represents the individual is able to be understood completely but a score of 5 indicates they are unable to be understood when speaking (Feeny et al. 1995; Health Utilities Inc 2018).

Table 7.2 below provides a summary of all the different wellbeing indices discussed, highlighting the method of construction, the index components, weighting and scoring range.

Table 7.2: Summary of Different Wellbeing Indices from the Existing Literature

Reference	Method	Components in index	Weighting method	Scoring range
Cummins et al. (2003)	Principal Component Analysis	- Satisfaction with standard of living - Health - Achieved in life - Personal relationships - How safe you feel - Community connectedness - Future Security - Country's economic situation - State of the environment - Social conditions	Not clearly defined.	0 – 100.
OECD (n.d.a)	Framework for measuring wellbeing	- Health status - Work life balance - Education and skills - Social connections - Civic engagement and governance - Environmental quality - Personal security - Subjective wellbeing - Income and wealth - Jobs and earnings - Housing - Natural capital - Human capital - Economic capital - Social capital	Not clearly defined.	Each component scored 0 – 10.
UNDP (n.d.), UNDP (2019)	Composite Index	- Long healthy life - Being knowledgeable - Having a decent standard of living	Not clearly defined	4 different index score categories: Low human development: (< 0.550) Medium: (0.550 – 0.699) High: (0.700 – 0.799) Very high: (>0.800)

Reference	Method	Components in index	Weighting method	Scoring range
ANDI (n.d.a), ANDI (n.d.b)	Composite index.	- Children and young peoples wellbeing - Community and regional life - Culture, recreation and leisure, Governance and democracy - Economic life and prosperity - Education, knowledge and creativity - Environment and sustainability - Justice, fairness and human rights - Health - Indigenous wellbeing - Work and work life balance - Subjective wellbeing and life satisfaction	Weighting method to be determined.	Scoring range to be determined.
CIW (n.d.), Michalos et al. (2011)	Composite Index Method	- Healthy Populations - Living standards - Education - Time use - Leisure and culture - Environment - Community, vitality - Democratic engagement	Equally Weighted.	Scoring measured as percentage change from base year (1994), starting value at 100.
NEF (2012)	Use of 3 different measures to measure wellbeing.	- Short Warwick-Edinburgh Mental Wellbeing Scale - Office for National Statistics Subjective Wellbeing question - Question on social trust	Not clearly defined.	Each has their own scoring. Wellbeing scale: none of the time, rarely, some of the time, often, all of the time. Other 2 scales scored from 0 – 10.
Feeney et al. (1995), Health Utilities Inc (2018).	Multi-Attribute Health Status Classification System.	- Vision - Hearing - Speech - Ambulation - Dexterity - Emotion - Cognition - Pain	Not clearly defined.	Each dimension is scored from 1 – 5 or 1 – 6. Index is the sum of all the dimension scores.

7.5 How the Wellbeing Index is Constructed

This section describes and justifies the variables included in the wellbeing index, followed by the contribution of this index to the wider literature.

In order to generate the wellbeing index, nine different wellbeing outcomes outlined in section 4.4 are experimented with using PCA. The final wellbeing index comprises of the following variables – satisfaction with community, home and finance, mental health, role-emotional, vitality and social functioning. This means the psychological distress and role-physical variables are omitted from the final index. One reason that psychological distress is excluded is due to this variable only having 84,279 observations compared to the other eight wellbeing outcomes which ranged from 238,009 to 268,867 observations. This is because the psychological distress variable is only available every second wave from wave 7 onwards within the HILDA survey, while the other wellbeing outcomes are present in every wave. Another reason psychological distress is excluded is because the scoring is different to the other wellbeing variables. Psychological distress is scored from 10 – 50, compared to satisfaction scores from 0 – 10, and the SF-36 scores from 0 – 100. In addition to this, a higher score for psychological distress indicates worse levels of health, which is the opposite to how satisfaction and SF-36 are scored where a higher score represents better wellbeing.

The reason for role-physical health being removed is due to the index performing better without it. After these exclusions, the components became more unique in the sense that each variable is only present in one component. Removing the role-physical variable also lowers the unexplained variances of some of the variables. In particular, big improvements occurred to the satisfaction with finance and satisfaction with home variables which had their unexplained variances reduce by around 27%. Although role-physical health is omitted from the index, the physical aspect of health is by vitality, so physical health is not completely omitted from the index. Furthermore, as seen in table 5.3 and 6.4, role-physical outcomes are not significantly affected by tenure insecurity or housing precariousness. Meanwhile, table 6.6 and 7.13 showed that role-physical had little impact on experiencing precarious housing separately and overall.

The wellbeing index derived in this thesis aims to fill various gaps in the literature. Firstly, this index incorporates both health outcomes variables from the SF-36 survey and life satisfaction outcomes variables to measure wellbeing, which has not been done in the literature to the best of my knowledge. Combining these two different measures of self-reported health and self-reported satisfaction with life is beneficial because it allows for an individual's wellbeing to be assessed with a wider range of wellbeing aspects. Further to this, even though there is a question asking respondents to rate their overall satisfaction with life in the HILDA Survey, this index can provide a more thorough estimation of overall wellbeing as it considers numerous different self-reported measures of one's health instead of relying on just one question.

Secondly, there appears to be no studies that apply different weights to their index, with Cummins et al. (2003), OECD (n.d.a), UNDP (2019), ANDI (n.d.a), CIW (n.d.), NEF (2012) and Feeney et al. (1995) all using equal weighting or not clearly defining their weighting method. The index generated here differentiates itself by allocating different weights to each of the components. Furthermore, the weights are based on the results from the PCA (only Cummins (2013) has done something similar). This is more advantageous as it allows for the stronger components to highlight their relative importance on the overall index compared to the weaker ones. When equally weighting the dimensions in an index, this could potentially result in weaker components having a bigger impact on the overall score than they should (OECD 2008).

Further to this, even though this thesis' wellbeing index has different weights, it is only heavily weighted to component 1, while components 2, 3 and 4 are similar in weights, as seen further on in table 7.7. Thus, any policy that aims to address wellbeing should focus on the outcomes that compose component 1 as they are the strongest influences on overall wellbeing.

Thirdly, the thesis' wellbeing index consists of different variables compared to the other indices presented in table 7.2. The index Cummins et al. (2003) generates covers life satisfaction but not SF-36 health outcomes of mental and physical health. Compared to the HDI by UNDP (n.d.), health utilities index by Feeney et al. (1995) and CIW by

Michalos et al. (2011), which are all made up of objective measures, this index analyses subjective wellbeing instead.

7.6 Findings

This section provides the results of the PCA and EFA. In regard to the PCA, this includes details on the final structure of each index i.e. variables that makeup each principal component. In addition to this, the variance of the components (used to calculate weights) is also presented.

The PCA is conducted to investigate how might one measure the overall housing precariousness and wellbeing. The impacts of various forms of precarious housing on overall wellbeing are then uncovered through regression modelling, followed by modelling of the impacts of various wellbeing domains on overall precarious housing. The two models are not regressed on each other due to the risk of spurious regression (Brooks 2014). Lastly, the results of the EFA are documented, which further highlight the interrelationship between precarious housing and wellbeing.

7.6.1 Final Model Details – Precarious Housing Index

The composition of the precarious housing index is set out in this section, with the first four out of six components retained from the PCA, as reported below in table 7.3. The decision to retain the first four components is based on the Kaiser rule. As mentioned in section 4.9, all components with an eigenvalue or variance greater than one are kept. The cumulative column shows cumulatively how much variance each component is adding to the total variance of the index. The table displays that overall, these four components explain 78% of the total variance within the precarious index after a varimax rotation (see section 4.9) is performed.

Table 7.3: Principal Component Values for Precarious Housing Index after Varimax Rotation

Component	Eigenvalue (Variance)	Cumulative
Comp 1	1.59011	0.2650
Comp 2	1.0755	0.4443
Comp 3	1.03155	0.6162
Comp 4	1.00888	0.7843
Total Observations	226,360	

Source: Own calculations from the 2001-2018 HILDA Survey

Table 7.4: Structure of Precarious Housing Index Components after Varimax Rotation

Variable/Precarious Housing Indicator	Component 1	Component 2	Component 3	Component 4	Unexplained Variance
Forced to Move				0.9126	0.1356
Unaffordable Housing (>30%)		0.7749			0.2602
Overcrowded			0.9192		0.1257
Neighbourhood Crime	0.7041				0.2197
Neighbourhood Hostility	0.6886				0.223
SEIFA 2011 Decile of Index of Relative socioeconomic advantage/disadvantage		0.6173	0.3104	-0.3333	0.3298

Source: Own calculations from the 2001-2018 HILDA Survey
Note: only the correlations greater than 0.3 for each component are shown to show which variables drive each component.

Table 7.4 presents the first four components from the PCA and their correlation to the variables included in the index. The column on the end shows the amount of unexplained variance for each variable used in the index. Only the correlations greater than 0.3 are listed to highlight which domains of housing precariousness are driving each component. Each type of variable is dominant in one component with the exception of the SEIFA index which appears to be present in three of the four components. The unexplained variance column outlines how much variance is unexplained or missing from each

variable within the components chosen. The amount of variance that is unexplained within the precarious index ranges from 13% to 33%.

The first component of the precariousness index is mainly determined by the neighbourhood crime and hostility aspects of precariousness. The more often an individual experiences either of these factors, the higher their level of precariousness.

Individuals experiencing unaffordable housing and relative neighbourhood socioeconomic disadvantage appear to drive the second component. Low-income households that spend a large portion of their income on housing costs are more likely to live in a relatively more disadvantaged area.

In the third component, unsuitable housing and relative socioeconomic disadvantage are the major influences here. If an individual is residing in an overcrowded dwelling, then they are also more likely to be in a more disadvantaged neighbourhood.

Tenure insecurity and relative socioeconomic disadvantage are the strongest drivers in the fourth component. In this instance, the SEIFA index value within this component takes on a negative value. This indicates that individuals who have been forced to move are more likely to reside in relatively more advantaged neighbourhoods instead of disadvantaged ones.

A key reason why the SEIFA index is prevalent across three components is potentially due to the strong associations between neighbourhood socioeconomic levels and most other aspects of housing precariousness[3]. If an individual is in a relatively more disadvantaged area, one might expect to observe a higher chance of living in unaffordable housing, living in unsuitable housing or experiencing other negative neighbourhood effects. Moreover, another possible reason for this overlap is that when calculating a score for the SEIFA index, it takes into consideration overcrowding and housing costs (ABS 2018b). A potential explanation for the inverse relationship between SEIFA and forced moves is that low-income private renters are more likely to be forced to move into disadvantaged areas from more advantaged areas. This could be due to not being able to

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[3] Correlation coefficients between SEIFA and the housing precariousness variables were generated and ranged from -0.030 to -0.221, all significant at the 5% level.

afford housing costs anymore, as such, having to relocate to areas with higher disadvantage with lower housing costs. As a result of this, low-income private renters then become 'stuck' in these locations that are more disadvantaged. Additionally, research has found there to be a higher persistence of public housing renters within disadvantaged areas, thus, this results in lower rates of mobility in these areas (Parkinson et al. 2014).

7.6.2 Final Model Details – Wellbeing Index

The results of the PCA for wellbeing are presented in table 7.5. The first four out of seven components are retained from the resulting PCA. Akin to the precarious housing index, the decision to retain the first four components is based on the Kaiser rule. After a varimax rotation (see section 4.9) is conducted, the remaining four components explain 83% of the total variance within the wellbeing index.

Table 7.5: Principal Component Values for Wellbeing Index after Varimax Rotation

Component	Eigenvalue (Variance)	Cumulative
Comp 1	2.79824	0.3997
Comp 2	1.01288	0.5444
Comp 3	1.01275	0.6891
Comp 4	1.00067	0.8321
Total Observations	236,265	

Source: Own calculations from the 2001-2018 HILDA Survey

Table 7.6: Structure of Wellbeing Index Components after Varimax Rotation

Variable/Wellbeing Indicator	Component 1	Component 2	Component 3	Component 4	Unexplained Variance
Satisfaction with Community		0.9924			0.007566
Satisfaction with Home			0.9922		0.007922
Satisfaction with Finances				0.9991	0.0005648

Variable/Wellbeing Indicator	Component 1	Component 2	Component 3	Component 4	Unexplained Variance
Mental Health	0.4894				0.252
Role-Emotional	0.4947				0.3524
Vitality	0.4892				0.3035
Social Functioning	0.5258				0.2515

Source: Own calculations from the 2001-2018 HILDA Survey
Note: only the correlations greater than 0.3 for each component are shown to show which variables drive each component.

Table 7.6 above presents the first four components of the resulting PCA and their correlation to the variables included in the index. As with table 7.4, only the correlations greater than 0.3 are displayed here to highlight the wellbeing domains that significantly influence each component. Each type of wellbeing variable is only represented in one component here, with no duplicates across components unlike the precarious index which saw the SEIFA index present in multiple components. The unexplained variance column shows that between 0.006% to 35% of variance is unexplained within the wellbeing index.

The first component of the wellbeing index is primarily determined by the mental and emotional, physical and social aspects of an individual's overall wellbeing. This component is strongly correlated with the mental health, role-emotional, vitality and social functioning wellbeing outcomes. An individual that experiences an improvement in any of these outcomes is more likely to see an improvement in the remaining outcomes.

The next three components are each uniquely influenced by one of the three satisfaction measures used. Component 2 is strongly correlated with satisfaction with community, component 3 satisfaction with home and component 4 satisfaction with finances.

7.6.3 Weighting and Scaling the Precarious and Wellbeing Indices

To calculate the weights for either index, the eigenvalues from the four different components are added together to calculate a total variance. The component weights are calculated by dividing the individual eigenvalues/variance by the total variance. This is

different to how indexes have been weighted in the literature as most tend to apply equal weights, such as those constructed by Baker et al. (2019), Beer et al. (2019) and Michalos et al. (2011). This can unnecessarily hinder stronger components and subsequently strengthen weaker ones, potentially distorting the true results from an analysis. The weighting method used here places higher emphasis on component one for both indices, while components 2, 3 and 4 have similar weights. The eigenvalues are shown in table 7.3 and 7.5 above and the values for each component weighting appear in table 7.7 below. In order to make both the precarious and wellbeing indices more consistent, they are both scaled so that their minimum values start at 0.

Table 7.7: Weighting of Components within Precarious Housing and Wellbeing Indices

	Precarious Housing Index	**Wellbeing Index**
Component 1	0.338	0.480
Component 2	0.229	0.174
Component 3	0.219	0.174
Component 4	0.214	0.172

Source: Own calculations from the 2001-2018 HILDA Survey

7.6.4 Links Between Precarious Housing and Overall Wellbeing

Table 7.8 displays a range of summary statistics for the housing precariousness and wellbeing indices at time *t* that are weighted and scaled. This table outlines that the samples average for wellbeing is quite high at 5.0 out of the total scoring range of 0 to 6.9. Additionally, the levels of overall precariousness experienced is low at 1.0 out of the total ranging from 0 to 5.6. Table 7.9 shows that the average overall wellbeing score further declines for each extra aspect of housing precariousness reported, starting at a score of 5.2 at zero forms and falling to 4 when four forms are encountered, a 23.1% decrease.

The average wellbeing index scores for different precarious housing indicators are presented in table 7.10, with the statistical significance tested via t-tests. The general trend

evident from the results is that each form of precarious housing is associated with lower levels of average overall wellbeing. This is then reversed for table 7.11, which displays the average overall precarious housing index score for those who have low wellbeing and those who do not, with the statistical significance also tested via t-tests. Here, low wellbeing is classified differently for each wellbeing indicator. A score of 7 or less indicates low satisfaction. A score of 50 or less indicates low wellbeing for the mental health, role-emotional health, vitality, role-physical health and social functioning outcomes. Because psychological distress is scored differently, a score of 22 or higher indicates high levels of distress. The findings here show a link between separate poor wellbeing indicators and increased overall housing precariousness. A low score for a wellbeing indicator is associated with a 10% to 30% increase to the average overall precarious housing score.

Table 7.8: Summary Statistics of Precarious Housing and Wellbeing Indices, 2001 – 2018.

Index	Mean	Observations	Scoring Range
Precarious Index (Weighted, Scaled)	1.040	226,360	0 – 5.6
Wellbeing Index (Weighted, Scaled)	5.032	236,128	0 – 6.9

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Table 7.9: Mean Wellbeing Index Score, by 0 – 4 Different forms of Precariousness Experienced, 2001 – 2018.

Number of precarious housing aspects	Wellbeing Index Score
0 Forms	5.2
1 Form	4.8
2 Forms	4.5
3 Forms	4.3
4 Forms	4.0

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Table 7.10: Mean Wellbeing Index Score, by Precarious Housing Indicator, 2001 – 2018.

Precarious Housing Indicator		Wellbeing Index Score
Mean Wellbeing Score 2001 – 2018.		5.0
Forced Move	Yes	4.5**
	No	5.0

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Precarious Housing Indicator		Wellbeing Index Score
Unaffordable 30%	Yes	4.6**
	No	5.1
Overcrowded	Yes	4.7**
	No	5.0
Neighbourhood Crime	Yes	4.8**
	No	5.1
Neighbourhood Hostility	Yes	4.7**
	No	5.1
SEIFA Decile of Index – 20th Percentile	Yes	4.8**
	No	5.1

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.
Note: ** Difference between 'yes' and 'no' statistically significant at the 1% level, *Difference between 'yes' and 'no' statistically significant at the 5% level.

Table 7.11: Mean Precarious Housing Index Score, by Wellbeing Outcome, 2001 – 2018.

Wellbeing Outcome		Precarious Housing Index Score
Mean Precarious Housing Index Score 2001 – 2018.		1.0
Low satisfaction with home	Yes	1.2**
	No	1.0
Low satisfaction with community	Yes	1.1**
	No	0.9
Low satisfaction with finances	Yes	1.1**
	No	0.9
Low mental health	Yes	1.3**
	No	1.0
High psychological distress	Yes	1.1**
	No	1.0
Low role-emotional	Yes	1.2**
	No	1.0
Low vitality	Yes	1.1**
	No	1.0
Low role-physical	Yes	1.1**
	No	1.0
Low social functioning	Yes	1.2**
	No	1.0

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.
Note: ** Difference between 'yes' and 'no' statistically significant at the 1% level, *Difference between 'yes' and 'no' statistically significant at the 5% level. Low satisfaction: <= 7; low wellbeing (mental health, role-emotional, vitality, role-physical, social functioning): <= 50; high psychological distress: >= 22.

7.6.5 Precarious Housing and Wellbeing Indices over Time

The graphs shown in figures 7.1 to 7.10 all display the weighted and scaled housing precariousness and wellbeing indices over time for different segments of the sample. These two indices are analysed alongside education level, income, employment status

and different age brackets. It is evident from these figures that in general, the more disadvantaged groups experience higher levels of housing precariousness and lower levels of wellbeing.

Figure 7.1 shows that the precarious housing index has steadily declined over time from 2001 to 2018. Higher education level, income and working full-time are all associated with lower levels of housing precariousness, as seen in figures 7.2 to 7.4. Regarding age effects, it is evident from figure 7.5 that precariousness for younger cohorts are higher than older cohorts.

Moving onto examining the wellbeing index, there is a distinct "U" shape relationship between 2001 and 2018. Wellbeing appears to have gradually increased from 2001 to 2007, from which point there is a gradual downward trend until 2018 with there being a steep drop between 2009 and 2010. Overall, wellbeing levels are reported to be slightly lower in 2018 than in 2001. Figures 7.7 to 7.9 indicate that higher levels of wellbeing are associated with higher education levels and income as well as full-time employment. Focusing on figure 7.10, the older age groups are generally better off in terms of wellbeing, although over time, there is a downward trend from 2011 onwards for the 15-24 and 25-34 age groups.

Figure 7.1:

Precarious Index Weighted and Scaled

Figure 7.2:

Mean of Precarious Index Weighted and Scaled over Highest Education Level

Figure 7.3:

Mean of Precarious Index Weighted and Scaled over Income Group

Figure 7.4:

Mean of Precarious Index Weighted and Scaled over Employment Status

Figure 7.5

Mean of Precarious Index Weighted and Scaled over Age Brackets

Legend: Age15-24, Age25-34, Age 35-44, Age 45 - 54, Age 55 - 64, Age 65+

Figure 7.6

Wellbeing Index Weighted and Scaled

Figure 7.7

Mean of Wellbeing Index Weighted and Scaled over Highest Education Level

Legend: Year 11 or Below, Undergraduate, Postgrad

Figure 7.8

Mean of Wellbeing Index Weighted and Scaled over Income Group

Legend: Low Income, High Income

Figure 7.9

Mean of Wellbeing Index Weighted and Scaled over Labour Force Status

Figure 7.10

Mean of Wellbeing Index Weighted and Scaled over Age Brackets

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

7.6.6 Impact of Precarious Housing on Overall Wellbeing

Attempting to investigate the impact of overall precariousness on overall wellbeing (and vice-versa) using a regression framework would lead to spurious results (Brooks 2014) since both indices contain time trends (refer to fig 7.1 and 7.6). As such, this section measures the impact of the individual housing precariousness indicators at time t on overall wellbeing at time $t+1$ using a fixed effects OLS model, as reported in table 7.12.

It is apparent that unaffordability has the greatest influence, both factors being associated with around a 1% decline (on average) to overall wellbeing. This is an indication that these two domains cause the most significant detriment to general wellbeing levels. This could be due to high levels of housing costs reducing the amount of economic resources available to individuals, therefore limiting access to basic and essential needs and services. Additionally, this would cause increased stress which can adversely affect multiple aspects of wellbeing. These effects are related to the findings from Baker et al. (2014) who concluded that individuals in unaffordable housing are more likely to report poor or fair self-assessed general health. These results are also comparable to the study by Mallett et al. (2011), in which they persons dealing with precarious housing have in general, worse health than those not facing housing precariousness.

Being divorced is associated with a 1.2% improvement (on average) in overall wellbeing, which is unexpected as marital breakdown is generally associated with worse outcomes. Unpacking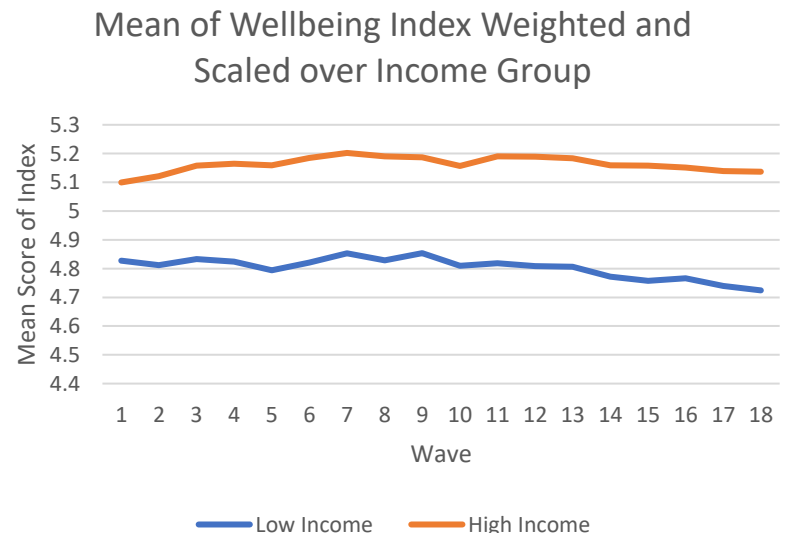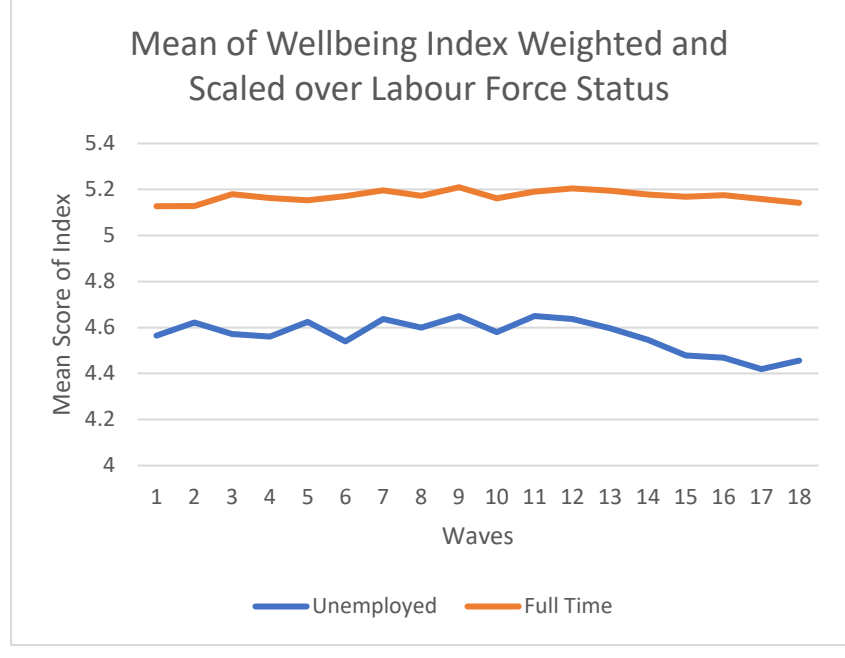 potential age effects, those that are 45 years and older are found to have 4% to 7.8% higher levels of overall wellbeing than the younger age groups. Additionally, possessing a university level education results in improved overall wellbeing by around 1% to 2% (on average) when compared to those that only finished high school. This is similar to Dalstra et al.'s (2006) finding that poor health was much more prevalent amongst the lowest education group than more highly educated groups.

Table 7.12: Impact of Precarious Housing Indicators at *t* on Overall Wellbeing at time *t*+1, fixed effects OLS model, 2001 – 2018.

Predictors	Coefficient (Std. error)
Forced to move	-0.019 (0.010)
Unaffordable 30%	-0.028** (0.008)
Overcrowded	-0.013 (0.011)
Neighbourhood crime	-0.010** (0.002)
Neighbourhood hostility	-0.020** (0.002)
SEIFA index	-0.015** (0.004)
Owner with a mortgage	-0.006 (0.006)
Private renter	-0.060** (0.008)
Public renter	-0.074** (0.018)
Other tenure type	-0.046** (0.013)
Dependent children	-0.063** (0.006)
De facto	0.033** (0.009)
Separated	-0.042** (0.013)
Divorced	0.058** (0.014)
Widowed	0.004 (0.016)
Single not married	0.010 (0.011)
Age 25 - 34	0.040** (0.010)
Age 35 - 44	0.127** (0.014)
Age 45 - 54	0.205** (0.017)
Age 55 - 64	0.310** (0.021)
Age 65+	0.398** (0.025)
Has long-term health condition	-0.099** (0.005)
Postgraduate	0.098** (0.023)
Graduate diploma	0.077** (0.022)
Undergraduate	0.056**

Predictors	Coefficient (Std. error)
	(0.014)
Diploma	0.004
	(0.018)
Certificate	-0.024
	(0.011)
Part-Time	0.004
	(0.005)
Unemployed	-0.030**
	(0.010)
Not in the labour force	-0.022**
	(0.006)
Low-income	-0.024**
	(0.005)
R-Squared	0.052
Constant	5.092**
F-Stat	27.89**
N	179,892

Source: Authors' own calculations from the 2001-2018 HILDA Survey.
Notes: ** $p < 0.01$, * $p < 0.05$. The reference categories are outright owner, legally married, age 15-24 years, highest qualification from high school, full-time employed, medium-to-high income. Standard errors are in parentheses. Region and Wave coefficients are reported in Appendix C1.

7.6.7 Impact of Wellbeing on Overall Housing Precariousness

This section measures the impact of separate wellbeing outcomes on overall housing precariousness. The overall wellbeing index is not deployed for the same reason as explained in the previous section (spurious regression). Table 7.13 displays the fixed effects OLS model where the precarious housing index at time $t+1$ is modelled as a function of separate wellbeing indicators and other controls at time t. Additionally, the SF-36 outcomes have been converted to a score of $0 - 10$ instead of $0 - 100$ in this model to match the scoring range of the satisfaction outcomes.

The higher a respondent's mental health or satisfaction with home and community, the lower their levels of overall precarious housing, with every one point improvement to satisfaction or every 10-point improvement to mental health, resulting in lower precariousness by 0.8% to 2.3% (on average). Baker et al. (2017) uncovered similar findings in which persons with the poorest health have the greatest exposure to housing problems, which can therefore affect their health even further.

The 3% decline to overall precariousness experienced by those in public rentals is unexpected. The general finding amongst studies that residents in public housing generally experience more precarious housing issues (Andersen et al. 2017; Nolan and Winston 2011). This could potentially be due to public renters not typically dealing with forced moves or unaffordability, two of the factors that make up the precarious housing index. In comparison to being married, separation or divorce raises overall precariousness by around 6% (on average). Low-income status or unemployment is associated with a 2.8% and 3.9% increase (on average) to overall precarious housing respectively. The decline endured as a result of unemployment is consistent to what Baker et al. (2017) found where this group are among those more likely to suffer from accumulated negative housing factors.

Table 7.13: Impact of Wellbeing at *t* on Overall Housing Precariousness at time *t*+1, fixed effects OLS model, 2001 – 2018.

Predictors	Coefficient (Std. error)
Satisfaction with home	-0.024** (0.001)
Satisfaction with community	-0.008** (0.001)
Satisfaction with finance	-0.004** (0.001)
Mental health	-0.008** (0.001)
Role-emotional	0.000 (0.000)
Vitality	-0.002 (0.001)
Role-physical	0.000 (0.000)
Social functioning	-0.002** (0.001)
Owner with a mortgage	-0.042** (0.003)
Public renter	-0.031** (0.012)
Other tenure type	-0.019* (0.008)
Dependent children	-0.004 (0.004)
De facto	0.028** (0.006)
Separated	0.058**

Predictors	Coefficient (Std. error)
	(0.009)
Divorced	0.063**
	(0.009)
Widowed	0.013
	(0.011)
Single not married	0.037**
	(0.008)
Age 25 - 34	-0.028**
	(0.007)
Age 35 - 44	-0.064**
	(0.010)
Age 45 - 54	-0.072**
	(0.012)
Age 55 - 64	-0.087**
	(0.015)
Age 65+	-0.109**
	(0.018)
Has long-term health condition	0.001
	(0.003)
Postgraduate	0.000
	(0.016)
Graduate diploma	-0.013
	(0.015)
Undergraduate	0.022*
	(0.010)
Diploma	0.022
	(0.012)
Certificate	0.016*
	(0.008)
Part-Time	0.002
	(0.004)
Unemployed	0.041**
	(0.007)
Not in the labour force	-0.004
	(0.005)
Low-income	0.029**
	(0.003)
R-Squared	0.103
Constant	1.518**
F-Stat	62.20**
N	191,238

Source: Authors' own calculations from the 2001-2018 HILDA Survey.
Notes: ** $p < 0.01$, * $p < 0.05$. The reference categories are outright owner, legally married, age 15-24 years, highest qualification from high school, full-time employed, medium-to-high income. Standard errors are in parentheses. Region and Wave coefficients are reported in Appendix C1.

7.6.8 EFA Results

This section contains the results of the EFA which was described in section 4.10 of the thesis. The purpose of this analysis is to explore the relationship between the observed

variables (survey indicators) and the latent variables (overall precariousness and overall wellbeing). EFA, a measurement model of latent variables, is often deployed as a compliment to a PCA, which is a linear combination of variables.

The two latent variables that are investigated in this thesis are wellbeing and housing precariousness, which are presented in figure 7.11 and 7.12. The variable names on the left-hand side in the boxes indicate the measured or observed variables being examined while the circle on the right-hand side represents the latent variable. The overall concept of wellbeing is regarded as being unobservable, with the wellbeing outcomes in this thesis being chosen for the goal of attempting to measure this latent construct of wellbeing (Kristoffersen 2017). The EFA method will investigate if the wellbeing outcome variables chosen can explain the structure of the latent variable – overall wellbeing. This process is then repeated for precarious housing. Finally, the wellbeing and precarious housing variables are combined into the one EFA, the purpose to investigate the two latent constructs in combination.

Figure 7.11: Wellbeing as a Latent Variable
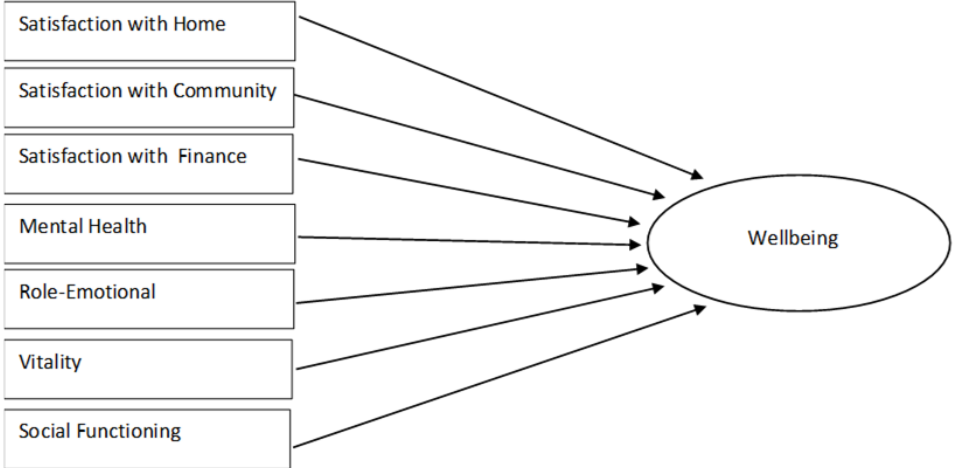
Figure 7.12: Precarious Housing as a Latent Variable
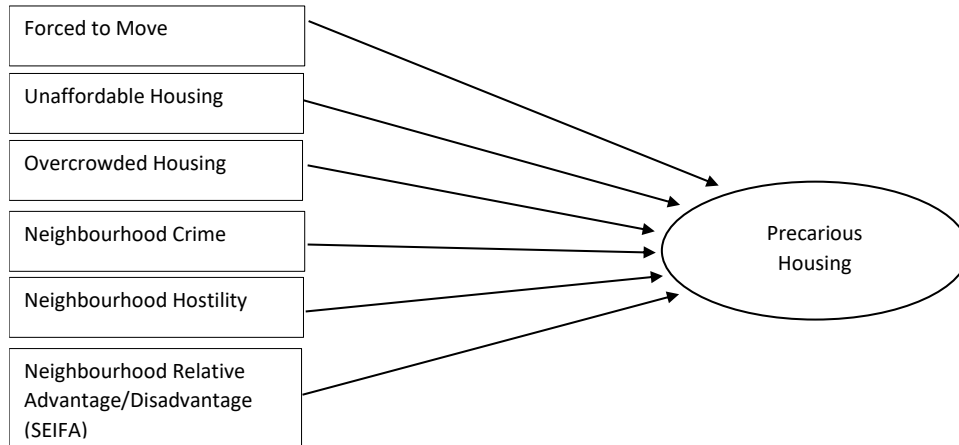
Tables 7.14 – 7.16 display the factors, the eigenvalues or variances of each factor, the proportion of the overall variance in addition to the cumulative variance after a varimax rotation is conducted. The precarious housing factor analysis retained three factors based on the Kaiser rule, explaining 62.9% of the variance for the latent construct. The factor analysis conducted on wellbeing resulted in the first two factors being kept, explaining a similar amount of variance at 63.7%. The EFA exploring both these latent constructs together shows the first five factors being kept at 63.6%, a third of the total cumulative variance being explained in the first factor.

Table 7.14: Factor Analysis Values for Precarious Housing

Factor	Eigenvalue	Proportion	Cumulative
Factor 1	1.604	0.267	0.267
Factor 2	1.108	0.185	0.452
Factor 3	1.059	0.177	0.629

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Table 7.15: Factor Analysis Values for Wellbeing

Factor	Eigenvalue	Proportion	Cumulative
Factor 1	2.817	0.403	0.403
Factor 2	1.643	0.235	0.637

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Table 7.16: Factor Analysis Values for Precarious Housing and Wellbeing

Factor	Eigenvalue	Proportion	Cumulative
Factor 1	2.871	0.221	0.221
Factor 2	1.627	0.125	0.346
Factor 3	1.564	0.120	0.466
Factor 4	1.144	0.088	0.554
Factor 5	1.066	0.082	0.636

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Next, tables 7.17 – 7.19 present the factor loadings and unique variances, outlining the composition of each factor for the three EFA's conducted. In each table, only the correlations greater than 0.3 have been shown to display which variables are strongly influencing each factor. Regarding precarious housing by itself in table 7.17, neighbourhood crime and hostility drive factor 1, forced move and unaffordability factor 2 and overcrowded and SEIFA factor 3. The SEIFA index and forced to move factors have quite high levels of residual variance at 60.2% and 50.5%. A higher uniqueness indicates that the variable is less relevant to the latent construct of housing precariousness.

Moving onto wellbeing presented in table 7.18, factor 1 is strongly driven by the various SF-36 health measures while factor 2 the satisfaction measures. Mental health and social functioning have low unexplained variance at around 25% while satisfaction with community and finance are relatively high at 48%.

The precarious housing and wellbeing variables are combined into an EFA, the results displayed in table 7.19. Comparing these values to the previous ones, the residual variance is mostly similar. Some key differences noted though include an extra 6.9% of residual for forced to move and a lower residual for SEIFA by 8%. All the EFA findings presented here build a foundation for simultaneous effects between housing precariousness and wellbeing to be examined in future research.

Table 7.17: Components of Precarious Housing Factor Analysis

Variable	Factor 1	Factor 2	Factor 3	Uniqueness
Forced Move		0.704		0.505
Unaffordable 30%		0.755		0.429
Overcrowded			0.875	0.230

Variable	Factor 1	Factor 2	Factor 3	Uniqueness
Neighbourhood Crime	0.868			0.239
Neighbourhood Hostility	0.875			0.224
SEIFA			0.530	0.602

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Table 7.18: Components of Wellbeing Factor Analysis

Variable	Factor 1	Factor 2	Uniqueness
Satisfaction with Home		0.768	0.407
Satisfaction with Community		0.704	0.484
Satisfaction with Finance		0.685	0.477
Mental Health	0.830		0.255
Role-Emotional	0.804		0.354
Vitality	0.812		0.311
Social Functioning	0.863		0.252

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

Table 7.19: Components of Precarious Housing and Wellbeing Factor Analysis

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Uniqueness
Satisfaction with Home			0.751			0.404
Satisfaction with Community			0.703			0.463
Satisfaction with Finance			0.619			0.469
Mental Health	0.830					0.257
Role-Emotional	0.802					0.354
Vitality	0.817					0.304
Social Functioning	0.862					0.249
Forced Move				0.648		0.574
Unaffordable 30%				0.757		0.419
Overcrowded					0.865	0.232
Neighbourhood Crime		0.859				0.247
Neighbourhood Hostility		0.860				0.234
SEIFA		0.310			0.523	0.522

Source: Authors' own calculations from 2001 – 2018 HILDA Survey.

7.7 Chapter Summary

This chapter has addressed the third research question concerning how overall wellbeing is affected by housing precariousness, how overall housing precariousness is affected by wellbeing and the factors that affect both overall housing precariousness and wellbeing. In order to address the first part of this question, a PCA was conducted to combine the forced to move, unaffordability, overcrowded, neighbourhood crime, hostility and

relative disadvantage variables into a housing precariousness index. This technique is then repeated for the wellbeing variables of satisfaction with home, community, finance, mental health, role-emotional, vitality and social functioning to be amalgamated into the wellbeing index.

The two regression models executed have measured the effect of individual precarious housing indicators on overall wellbeing, as well as the impact of individual wellbeing indicators on overall precariousness. The findings from these models shed light on the importance of not just focusing on the separate dimensions to wellbeing and precarious housing, but to also take into consideration the overall wellbeing and precarious housing outcomes. Dealing with unaffordability has the most notable impact to overall wellbeing, causing a roughly 1% decline in the overall wellbeing index (on average). Meanwhile, satisfaction with the home, community and mental health are the key wellbeing outcomes in predicting overall housing precariousness.

The results from the EFA indicate that the precarious housing and wellbeing variables analysed in this thesis explain a significant portion of the variance of the latent constructs examined. Although no causal effects can be concluded from these EFA findings, it lays a foundation for simultaneous effects between the two concepts to be investigated in the future.

Chapter 8 concludes the thesis by summarizing the key findings and detailing the policy implications of this research. The chapter also highlights the limitations of the analyses presented in this thesis which can be addressed in future research.

Chapter 8 – Conclusion

8.1 Motivations for Thesis

This thesis attempts to address issues that are important to the wellbeing of Australians, and on the agenda of policymakers. High levels of wellbeing for the population means that people can lead fulling lives with purpose and meaning, as well as encouraging economic development, social development in addition to supporting economic recovery (DHSC and PHE 2014; NZ Treasury 2019; WHO 2013). Conversely, poor wellbeing can waste potential and drain resources across different sectors within society (WHO 2013).

Attaining high levels of wellbeing can be complicated however, and is not solely achieved through economic growth as growth by itself does not always lead to an improvement in living standards (NZ Treasury 2019). The concept of wellbeing can play a key role in this as it provides policymakers an alternative metric in order to track these improvements in the quality of life for the population (NZ Treasury 2019; Schulte et al. 2015; WHO n.d.). Countries around the world are starting to take the concept of wellbeing more seriously. For instance, New Zealand, OECD members countries and countries apart of the EU are employing wellbeing in their policy frameworks (OECD 2018; NZ Treasury 2019; WHO 2013). Housing policies are a key area that takes advantage of this, aiming to improve the wellbeing of the population (OECD n.d.b)

Housing has been identified as a key factor in influencing the wellbeing of the population. It is regarded as fundamental to all aspects of life, as well as unlocking opportunity and enhancing various aspects of one's life (ShelterWA 2018). This topic is current and relevant to various government priorities and agendas within Australia. For instance, the Government of Western Australia and the City of Melbourne have both recently released strategies that aim to improve access to affordable housing. Furthermore, the recent outbreak of COVID-19 has highlighted the important role of secure housing in avoiding transmissions of infectious diseases and promoting good health and wellbeing. As such, the local governments within each state of Australia have introduced their own moratoriums on residential tenancy evictions. The common goal of these is to protect tenants during this time from evictions and rent increases, especially those in financial distress as a result of the pandemic.

This thesis has filled several gaps in the knowledge base in the following ways. Firstly, tenure insecurity has been explored in the context of both housing precariousness and residential mobility. Secondly, a wider variety of precarious housing dimensions and wellbeing outcomes have been analysed in this thesis compared to previous studies. Thirdly, the thesis has conducted a comprehensive up-to-date investigation of the bi-directional relationship between wellbeing and housing precariousness. Fourthly, a precarious housing index was generated combining the four domains of tenure insecurity, unaffordable housing, unsuitable housing and insecure neighbourhoods. Additionally, a wellbeing index was generated using SF-36 health outcomes and life satisfaction measures, which has not been attempted by previous studies. Lastly, this thesis draws on up-to-date national data from 2001 to 2018 and therefore offers nationally generalizable estimates that reflect the current housing market and economic conditions.

8.2 Key Findings

The key findings from the multiple analyses conducted in this thesis are presented in this section. Each subsection addresses a key research question of the thesis.

8.2.1 How does Tenure Insecurity Affect the Wellbeing Outcomes of Australian Adults? Does this Effect Differ by Income, Gender and Age?

The wellbeing of individuals is adversely impacted by tenure insecurity, with the wellbeing domains affected differing between the two types of insecurity. The financial satisfaction and psychological distress levels of those who are forced to move are impacted the greatest, with forced moves driving around a 3% decline in these wellbeing outcomes. Private rental status has an even larger effect on wellbeing, driving down the three satisfaction outcomes by 4.2% to 8.8%.

Low-income status appears to exacerbate the negative effect of private rental status on one's role-emotional and vitality levels. However, there is no significant difference in effect between the genders for those experiencing tenure insecurity. Regarding the effects

differing by age, youth seems to help minimise the negative effect tenure insecurity has on the wellbeing outcomes. However, living in private rental has an adverse effect on the mental health of youths in addition to the role-emotional health and vitality of mature age renters. This is quite concerning considering how large the private rental sector is in Australia at around 27% (ABS 2019). These findings further underscore the importance of addressing tenure insecurity issues within the private rental sector.

8.2.2 Which Dimensions of Housing Precariousness have the Largest Impact on Wellbeing and vice versa?

The bi-directional relationship between housing precariousness and wellbeing is evident from the analysis. Certain forms of precarious housing have stronger effects on wellbeing than others, while certain domains of wellbeing are more impacted by housing precariousness than others.

The key relationships flowing from housing precariousness at time t to wellbeing at $t+1$ are as follows. Being forced to move adversely affects satisfaction with community and finances by around 1%. The most significant impact of unaffordability on wellbeing manifests in the form of reduced financial satisfaction by 1.4%, whereas overcrowding results in a 1.3% reduction in satisfaction with the home one lives in. However, the effects of insecure neighbourhood on wellbeing appear to be relatively weaker than the rest of the precarious housing domains.

Some key relationships flowing from wellbeing at time t to housing precariousness at $t+1$ also emerge from the analysis. Satisfaction has most significant influence on housing precariousness, in particular, the satisfaction with home and finance domains.

8.2.3 How is Overall Wellbeing Affected by Housing Precariousness and How is Overall Housing Precariousness Affected by Wellbeing? What are the Factors that Affect Both Overall Housing Precariousness and Wellbeing?

In the PCA analysis, the neighbourhood crime and hostility domains in component 1 are found to have the strongest influence on overall precarious housing. Component 1 makes up 33.8% of the precarious housing index, while the remaining components explain 21.4% to 22.9% of the index. As for wellbeing, the mental health, role-emotional, vitality and social functioning wellbeing outcomes make up component 1 and appear to have the greatest influence on overall wellbeing. Component 1 makes up 48% of the wellbeing index, whereas the rest of the component only explain 17.2% to 17.4% of the index.

Two different regression models are run with the precarious housing and wellbeing indices as dependent variables. Unaffordability and neighbourhood hostility is found to have the most significant impact on overall wellbeing, with both factors causing a 1% fall in the wellbeing index. On the other hand, satisfaction with the home one lives in, satisfaction with feeling part of the community and mental health appear to be the strongest wellbeing predictors of overall housing precariousness levels. Every one point increase to satisfaction or 10-point increase to mental health reduces the precarious housing index by 0.8% to 2.3%.

The EFA sheds light on how much variance the precarious housing or wellbeing variables explain in the precarious housing and wellbeing latent constructs respectively. Concerning housing precariousness, neighbourhood crime and hostility as well as overcrowding explained 87% of variance in the latent construct. These variables also have the lowest amount of residual leftover with 22.4% to 23.9%. Regarding wellbeing, the mental health, role-emotional, vitality and social functioning outcomes explain over 80% of the variance in the latent construct.

8.3 Policy Implications and Recommendations

This thesis presents evidence that various forms of housing precariousness can have negative effects on the wellbeing outcomes of Australian adults. The findings, therefore,

have significant policy implications for the overall wellbeing of the Australian population.

8.3.1 Lease Terms and Rent Regulation

The findings indicate that private rental status is a key factor that reduces wellbeing outcomes. There is therefore a need to improve tenure security outcomes in the private rental sector in Australia, which is lightly regulated with respect to lease terms and rent levels.

An individual's security and stability would be improved if they had the ability to exercise choice over tenancy length, and having the option to remain in the dwelling for a substantial period of time if desired (Martin et al. 2018; Power 2017; Rowley and James 2018). In particular, tenure security is generally higher with longer leases, and fixed-term leases, which are more secure than non-fixed term leases (Minnery et al. 2003). There are other countries such as Germany, Sweden and Austria who offer most tenants unlimited tenure, which provides significantly greater tenure security than the shorter-term leases on offer in Australia. Furthermore, Canada, Ireland and Belgium encourage longer-term leases via law and policy (Hodgson et al. 2018).

Another important aspect for tenure security is rent regulation or rent price control, which is seen in other countries such as Spain, Belgium and Germany. This protects tenants by preventing landlords from trying to 'price out' tenants by increasing rent significantly in an attempt to force a tenant out of a tenancy (Iwata and Yamaga 2008; Minnery et al. 2003).

As a result of the difficulty of entry into the private rental sector in Australia, this has led to increased fragmentation, which can be described as when new segments emerge that fulfill distinct niches. From this, there has been increased informal pathways into the private rental market which allow a timely and direct method of access as it bypasses formal rental intermediaries. For example, individuals can connect with each other online and enter into subletting arrangements either short-term or long-term without the need for

a formal lease. There is also the ability to access an entire dwelling via a private landlord instead of a real estate intermediary (Parkinson et al. 2018).

While the previous two pathways are not necessarily negative experiences, there is an additional pathway taken by those as a last resort. This can be characterized by unregistered boarding house arrangements or room rentals, which includes small apartments being overcrowded. Within this last resort pathway, the tenancy arrangements tend to be exploitative and violate the tenant's rights, especially their safety. For instance, landlords would convert the living areas into a sleeping space so they can increase their rental returns. This pathway is primarily what needs to be the target of policy changes, to protect the most vulnerable who would often be the target of these 'rogue' landlords. Policy changes could focus on regulating these informal pathways and ensuring tenants are safe and secure within housing sourced via this pathway, whilst simultaneously not hindering access and supply to housing (Parkinson et al. 2018).

8.3.2 Without Grounds Tenancy Termination

Forced evictions was also found to have a significant negative impact on wellbeing. According to the ABS, approximately 19% of private renters' moves were involuntary in 2013-14, defined as being initiated by the landlord via notice (Productivity Commission 2019).

A lengthy lease term does not mean anything if the tenancy can be terminated with relative ease. A frequently proposed way to improve tenure security for tenants is to remove the ability for landlords to terminate a lease for no reason (Hodson et al. 2018; Martin et al. 2018). Policymakers may wish to tighten regulations so that landlords can only terminate a lease on prescribed grounds, for instance, failure to pay rent or damaging the property (Martin et al. 2018). Because without grounds termination are an option for landlords, this could result in reluctance on the part of the tenants to enforce their rights due to the fear of being evicted (Hodgson et al. 2018; Martin et al. 2018; Minnery et al. 2003).

8.3.3 Policy Focus on Low-Income Persons

The findings present evidence that the wellbeing outcomes of low-income individuals are more adversely impact by tenure insecurity than middle-to-high income individuals. Therefore, this highlights the need for policies that will specifically target the low-income population. This is because they are in greater need of policies to protect them from tenure insecurity as they are more vulnerable compared to the rest of the population. Low-income persons have less economic resources available to them, so the constant fear of moving due to tenure insecurity can be detrimental. Furthermore, moving houses can be quite costly, such as the costs of the security bond and removalists, which can drain the little resources available if one is not prepared.

8.3.4 Improving Affordability

Various studies have proposed policy options that make housing more affordable. For instance, Czischke and van Bortel (2018) describe the concept of affordability by splitting rental housing into three segments – social housing, affordable housing, and free market housing. If rent costs are left to the free market, then the costs will be based on local demand and supply conditions. This can potentially lead to central areas in a city being made expensive and leaving suburbs on the outskirts the only affordable option for some (Czischke and van Bortel 2018).

At the other end of the spectrum, social housing is often delivered by government agencies and not-for-profit organisations who support supply of housing to low-income households. Eligibility for social housing often depends on strict criteria that is based on household needs, deprivation, income, age and household composition. This ensures those who are most in need, such as the most vulnerable groups in society, receives this support (Czischke and van Bortel 2018). The issue in Australia currently however, is that public housing waiting lists are extremely long, with almost 150,000 eligible persons on this waitlist across Australia. This highlights the needs for a vast increase in the supply of social housing (Ong ViforJ and Leishman 2020).

In order to make housing affordable, costs would have to be made lower than the prices set by the free market. The target group for affordable housing generally consists of those ineligible for social housing but are unable to purchase a home or pay full market rents. Eligibility for affordable housing generally has more relaxed regulations in comparison to social housing. To achieve affordable housing, for-profit investors would have to accept a return on investment that is lower than what would be achieved if it is left to local market conditions. To encourage this practice, compensation would have to be provided for this lower return on investment, which could be in the form of incentives such as loan guarantees, financial grants or lower land prices (Czischke and van Bortel 2018).

8.3.5 Improving Overall Wellbeing and Overall Precarious Housing

The EFA findings from chapter 7 shed light on the separate wellbeing outcomes that affect overall wellbeing the most, as well as the separate precarious housing factors that affect overall housing precariousness the most.

After combining the separate wellbeing outcomes into the one index, overall wellbeing is found to be more strongly influenced by the mental health, role-emotional health, vitality and social functioning outcomes. Future policy could focus on these outcomes more as they appear to drive overall wellbeing the most, providing a potentially cost-effective solution to improving general wellbeing levels. Similar suggestions can be made about overall housing precariousness, which appears to more affected by neighbourhood crime and hostility. Therefore, policy changes targeting these two domains may have a more significant impact in improving overall housing precariousness.

8.3.6 Policies Targeting Housing and Health Simultaneously

Even though the links between housing and wellbeing have been thoroughly identified within the existing literature and the findings from this thesis, Australia seldom has

policies that target housing and health simultaneously. By contrast however, the US, UK and NZ all have policies that target housing and health simultaneously.

Within Australia, there are policies that target either health or housing, but often are not considered together enough in regard to policy.

There is currently in development a "National Preventive Health Strategy" in Australia, which forms part of the mental health and preventive health aspect of Australia's Long-Term National Health Plan. It is a 10-year plan that hopes to build on other work already developed to target and improve the health of the population. A potential drawback, however, is that this strategy does not take into account at all the role housing can play in influencing health and wellbeing (Department of Health 2020).

Other countries provide useful examples of how Australian policymakers might integrate good housing and good health as simultaneous goals within policy initiatives.

NZ have the "Healthy Homes Initiative" which has the goal of creating warm, dry and uncrowded homes by working with families, agencies and local partners to provide access to interventions and education that will assist in achieving this goal. The Ministry of Health in NZ acknowledges that these issues can heighten the risk of respiratory issues and other preventable health conditions. They also base this off the strong national and international evidence available which finds warmer and drier homes result in improved health outcomes. This program targets specific, vulnerable groups to achieve the greatest results (Ministry of Health 2020).

Furthermore, the UK in 2014 set out a Memorandum of Understanding, which outlines the shared commitment across the various government, health, social care and housing sectors in England. The aim is to achieve better health and wellbeing outcomes, as well as reducing health inequalities by providing healthy homes, communities and neighbourhoods in addition to effective services that meets individuals needs (DHSC & PHE 2014).

The US has a strategy for action that outlines all the priorities and targets in order to achieve healthy housing. The overarching goal of this strategy is to improve the lives of Americans by reducing health and safety issues in the home. The US government

recognizes the impact housing can have on public health, and calls on federal agencies to deliver actions in a coordinated effort to improve housing related factors that affect health (Federal Healthy Homes Work Group 2013).

8.4 Limitations of Thesis and Directions for Future Research

The analysis conducted in this thesis can be improved or extended via future research. This section sets out the various ways in which this could be done.

8.4.1 Methodological Refinements

Even though the analysis within this thesis tries to control for low-income effects, further exploration is needed of the extent to which the various low-income impacts are feeding through different forms of housing precariousness to affect wellbeing. For instance, as highlighted in chapter 6, each form of precarious housing had an effect on financial satisfaction in some way. Hence, further research is necessary to uncover the extent to which the precarious housing 'problem' is a symptom of income poverty.

Building on the previous point, there is the key question researchers try to answer where income is the key driver for all housing precariousness problems. Tables 5.3, 6.4, 6.6, 7.12 and 7.13 have all been rerun with a continuous income variable using a respondent's disposable income instead of the low-income flag as a sensitivity test, the results seen in appendix D1. The results for income across the models are generally weak and insignificant with the main findings seeing little change. However, future research could involve the use of these continuous income figures instead of using a flag to indicate a low-income household.

The role-emotional health, vitality, role-physical health and social functioning fixed effects OLS regression models apart of model set one in chapter 6 reported very low R-squared statistics from 0.0002 to 0.008, even though the model F-stats were highly significant. This is potentially an indication that the linear specification employed is not ideal for measuring these outcomes, as it is based on the assumption that the relationship

between housing and wellbeing is linear. Therefore, future work could involve experimentation with different non-linear model specifications.

Another point of change for future research could analyse the effect of lagging the precarious housing variables by several time periods instead of just one year as was done throughout this thesis. It is possible that the impacts of housing precariousness on wellbeing will only surface several years after the experience of housing precariousness rather than the immediate year after.

Future work will include simultaneous equation modelling within two-stage instrumental variable frameworks. The foundation for this modelling has been laid via the PCA and EFA conducted in chapter 7 of this thesis. This will allow testing to determine if overall housing precariousness and wellbeing simultaneously affect each other. As such, it will likely address the issue of endogeneity in a more robust manner than the method of leading and lagging variables by one time period which has been applied in this thesis.

8.4.2 Topic Extensions

The thesis research has given rise to additional dimensions of the links between precarious housing and wellbeing that are worth further investigation.

An additional topic for future research would revolve around investigating further the effect of multiple forms of housing precariousness on wellbeing. Preliminary evidence in table 6.2 suggest that the adverse effects of housing precariousness on wellbeing are more intense when multiple forms of housing precariousness exist. This could be extended via deploying regression models to uncover causal effects instead of relying on statistical associations. Further to this, combinations of precarious housing that are most toxic to wellbeing can also be examined. For example, is it a combination of insecure tenure and unaffordability that does the most damage? Or is it overcrowding and insecure neighbourhoods that leads to the greatest harm to wellbeing?

The current research is on the general population in Australia. Future work could involve targeting the effect of housing precariousness on specific vulnerable or high-risk groups

within Australia. For instance, focus could be put solely on those in social housing or the impacts on the wellbeing of Aboriginal and/or Torres Strait Islanders.

An additional direction for future research is to investigate the extent to which government rental assistance may help buffer the wellbeing outcomes of renters in precarious housing. This is an important future research direction because of this thesis has highlighted the tenure insecurity faced by those living in the private rental. In Australia, the primary form of rental assistance for low-income private renters is a demand-side subsidy called Commonwealth Rent Assistance (CRA). Future research will investigate the extent to which CRA mitigates the negative impacts of the private rental sector on wellbeing.

There is also scope to compare the differences in wellbeing between regional and metropolitan areas within each state in Australia. Although Australia is a highly urbanized nation, concerns with housing precariousness could vary quite greatly across geographical areas that offer different levels of access to essential health and other support services.

This thesis has relied solely on quantitative analysis of secondary data. Qualitative data could be collected in the future to draw out deeper responses from individuals on how precarious housing issues may affect them and the intricacies of the links between housing precariousness and wellbeing. The impacts on wellbeing could then be more thoroughly unpacked via an integration of quantitative and qualitative analyses within a mixed methods framework.

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Appendix

Appendix A1

Table 5.3 (cont'd): Effect of Tenure Insecurity and other forms of Residential Mobility at *t* on Wellbeing at *t*+1, fixed effects OLS model, 2001 – 2018.

	Satisfaction			Mental/emotional			Physical		Social
Predictors	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Balance of NSW	0.363**	0.430**	0.015	0.699*	-0.287	0.387	0.117	-1.148	-0.483
	(0.037)	(0.043)	(0.041)	(0.315)	(0.214)	(0.715)	(0.52)	(0.736)	(0.467)
Melbourne	0.266**	-0.062	0.086	0.367	0.557*	0.498	0.101	-0.544	-0.023
	(0.048)	(0.055)	(0.052)	(0.400)	(0.275)	(0.909)	(0.447)	(0.936)	(0.594)
Balance of Victoria	0.427**	0.504**	0.157**	0.330	0.628*	-0.443	0.568	-1.324	0.148
	(0.054)	(0.062)	(0.059)	(0.451)	(0.312)	(1.024)	(0.504)	(1.055)	(0.825)
Brisbane	0.318**	0.069	0.077	0.947*	-0.249	1.146	-0.262	-2.085*	0.152
	(0.046)	(0.052)	(0.050)	(0.384)	(0.259)	(0.873)	(0.430)	(0.899)	(0.570)
Balance of QLD	0.501**	0.381**	0.125**	0.849*	-0.369	1.654*	0.371	-0.996	0.730
	(0.043)	(0.050)	(0.048)	(0.364)	(0.246)	(0.827)	(0.407)	(0.852)	(0.176)
Adelaide	0.214**	-0.273**	0.180*	0.398	-0.350	0.737	0.934	-2.139	-0.080
	(0.068)	(0.078)	(0.074)	(0.569)	(0.397)	(1.293)	(0.636)	(1.331)	(0.845)
Balance of SA	0.462**	0.744**	0.274**	0.068	-0.316	0.916	-0.179	-1.721	-0.189
	(0.081)	(0.092)	(0.089)	(0.676)	(0.465)	(1.537)	(0.757)	(1.583)	(1.004)
Perth	0.196**	-0.116	0.052	1.022	0.342	1.937	0.565	-0.572	0.909
	(0.062)	(0.071)	(0.068)	(0.522)	(0.346)	(1.186)	(0.333)	(1.221)	(0.775)
Balance of WA	0.249**	0.417**	0.371**	1.769**	0.057	3.562*	1.008	-2.814	1.639
	(0.076)	(0.088)	(0.084)	(0.641)	(0.439)	(1.456)	(0.717)	(1.500)	(0.952)
Tasmania	0.283**	0.409**	0.207*	-0.089	0.740	0.180	0.022	0.583	1.332
	(0.077)	(0.088)	(0.084)	(0.646)	(0.445)	(1.467)	(0.722)	(1.511)	(0.959)
Northern Territory	0.305**	0.310**	0.378**	0.349	-1.196**	2.311	-1.119	-0.441	-0.383
	(0.076)	(0.087)	(0.084)	(0.638)	(0.420)	(1.450)	(0.714)	(1.494)	(0.948)
ACT	0.103	0.085	0.084	0.973	-0.479	1.015	0.036	-2.374	0.324
	(0.064)	(0.074)	(0.070)	(0.539)	(0.362)	(1.224)	(0.603)	(1.261)	(0.800)
Wave 2	-0.064**	-0.021	-0.028	0.132		0.516	-0.316	-0.546	-0.042
	(0.019)	(0.022)	(0.021)	(0.162)		(0.368)	(0.181)	(0.379)	(0.241)
Wave 3	0.011	0.107**	0.334**	0.338*		0.312	-0.652**	-1.650**	-0.149
	(0.020)	(0.022)	(0.022)	(0.165)		(0.374)	(0.184)	(0.385)	(0.244)
Wave 4	0.031	0.144**	0.362**	0.058		-0.454	1.078**	-1.763**	-0.539*
	(0.020)	(0.023)	(0.022)	(0.167)		(0.380)	(0.187)	(0.391)	(0.248)

Predictors	Satisfaction			Mental/emotional			Physical		Social
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Wave 5	-0.088** (0.020)	0.098** (0.023)	0.389** (0.022)	0.192 (0.169)		-0.511 (0.384)	-1.287** (0.189)	-3.109** (0.395)	-0.858** (0.251)
Wave 6	-0.055** (0.020)	0.112** (0.023)	0.400** (0.022)	0.232 (0.170)		-0.408 (0.387)	-1.297** (0.191)	-3.392** (0.399)	-0.621* (0.253)
Wave 7	-0.041 (0.021)	0.118** (0.024)	0.557** (0.023)	0.317 (0.175)	-0.331** (0.079)	-0.300 (0.398)	-1.598** (0.196)	-4.152** (0.410)	-0.832** (0.260)
Wave 8	-0.052* (0.022)	0.064** (0.025)	0.520** (0.024)	0.141 (0.181)		-1.720** (0.411)	-2.105** (0.202)	-5.567** (0.423)	-1.328** (0.268)
Wave 9	-0.032 (0.022)	0.087** (0.025)	0.535** (0.024)	0.655** (0.181)	-0.475** (0.071)	-1.024* (0.412))	-1.892** (0.203)	-5.426** (0.424)	-0.918** (0.269)
Wave 10	-0.072** (0.022)	0.133** (0.025)	0.483** (0.024)	0.052 (0.181)		-2.248** (0.42)	-2.786** (0.203)	-7.393** (0.424)	-2.594** (0.269)
Wave 11	-0.045* (0.021)	0.221** (0.025)	0.573** (0.024)	0.250 (0.180)	-0.318** (0.061)	-2.283** (0.409)	-2.594** (0.201)	-7.910** (0.421)	-2.128** (0.267)
Wave 12	-0.038 (0.022)	0.097** (0.025)	0.633** (0.024)	0.464* (0.185)		-2.181** (0.421)	-2.685** (0.207)	-8.493** (0.434)	-2.204** (0.275)
Wave 13	-0.019 (0.022)	0.033 (0.194)	0.677** (0.025)	0.445* (0.189)	-0.401** (0.055)	-2.938** (0.429)	-2.915** (0.211)	-9.311** (0.442)	-2.469** (0.280)
Wave 14	0.027 (0.023)	0.184** (0.026)	0.697** (0.025)	0.035 (0.194)		-4.064** (0.440)	-3.775** (0.217)	-11.001** (0.453)	-3.491** (0.288)
Wave 15	-0.026 (0.024)	0.219** (0.027)	0.779** (0.026)	-0.317 (0.198)	-0.090 (0.051)	-4.856** (0.451)	-4.519** (0.222)	-11.269** (0.464)	-4.399** (0.294)
Wave 16	0.008 (0.024)	0.211** (0.028)	0.821** (0.027)	-0.332 (0.203)		-4.650** (0.461)	-4.501** (0.227)	-11.664** (0.474)	-4.129** (0.301)
Wave 17	0.025 (0.025)	0.087** (0.029)	0.878** (0.028)	-0.413 (0.210)		-5.758** (0.478)	-5.088** (0.235)	-13.267** (0.493)	-4.957** (0.313)
Wave 18	0.077** (0.026)	0.246** (0.030)	0.905** (0.028)	-0.830** (0.216)		-6.379** (0.491)	-5.589** (0.242)	-13.053** (0.506)	-5.134** (0.321)

Source: Authors' own calculations from the 2001 – 2018 HILDA Survey.

Notes: ** p < 0.01, * p < 0.05. The reference categories are Sydney and wave 1. Standard errors are in parentheses.

Table 6.5 (cont'd): Effect of Housing Precariousness at *t* on Wellbeing at *t*+1, fixed effects OLS models, 2001 – 2018.

	Satisfaction			Mental / emotional Wellbeing			Physical Wellbeing		Social Wellbeing
Predictors	**Satisfaction with home**	**Satisfaction with community**	**Satisfaction with finance**	**Mental health**	**Psychological distress**	**Role-Emotional**	**Vitality**	**Role-Physical**	**Social Functioning**
Postgraduate	0.030	0.169**	0.206**	1.137**	-0.354	2.144*	0.734	3.806**	2.637**
	(0.051)	(0.057)	(0.056)	(0.438)	(0.279)	(1.010)	(0.492)	(1.040)	(0.660)
Graduate diploma	-0.015	0.153**	0.155**	0.739	0.271	2.739**	0.775	2.395*	1.443*
	(0.048)	(0.054)	(0.053)	(0.409)	(0.272)	(0.944)	(0.459)	(0.972)	(0.618)
Undergraduate	-0.066*	0.063	0.174**	0.815**	-0.090	1.846**	0.555	0.706	1.170**
	(0.031)	(0.035)	(0.034)	(0.266)	(0.169)	(0.614)	(0.299)	(0.632)	(0.402)
Diploma	-0.092*	0.010	0.010	0.140	-0.141	1.018	0.011	1.187	0.678
	(0.039)	(0.043)	(0.043)	(0.333)	(0.212)	(0.770)	(0.374)	(0.792)	(0.503)
Certificate	-0.120**	-0.089**	0.063*	-0.202	0.068	-0.893	-0.193	0.283	0.001
	(0.024)	(0.027)	(0.027)	(0.212)	(0.136)	(0.489)	(0.238)	(0.503)	(0.320)
Part-Time	0.015	0.089**	-0.150**	0.191	-0.003	0.275	0.303**	-0.333	-0.127
	(0.012)	(0.013)	(0.013)	(0.102)	(0.064)	(0.236)	(0.115)	(0.243)	(0.154)
Unemployed	-0.011	0.005	-0.319**	0.043	0.289*	-0.771	0.314	-1.523**	-0.495
	(0.022)	(0.024)	(0.024)	(0.187)	(0.116)	(0.433)	(0.210)	(0.445)	(0.282)
Not in the labour force	0.026	0.147**	-0.236**	-0.034	0.069	-1.807**	0.188	-2.721**	-0.988**
	(0.014)	(0.016)	(0.016)	(0.120)	(0.076)	(0.278)	(0.135)	(0.286)	(0.182)
Balance of NSW	0.174**	0.271**	-0.043	0.507	0.138	1.985**	-0.747*	-1.499	-0.839
	(0.038)	(0.043)	(0.042)	(0.330)	(0.210)	(0.762)	(0.370)	(0.784)	(0.496)
Melbourne	0.065	-0.035	0.059	0.441	0.243	2.518*	0.052	-0.904	-0.205
	(0.050)	(0.056)	(0.055)	(0.438)	(0.282)	(1.012)	(0.491)	(1.041)	(0.660)
Balance of Victoria	0.200**	0.332**	0.085	0.199	0.546	0.679	0.130	-1.223	-0.983
	(0.055)	(0.062)	(0.061)	(0.484)	(0.313)	(1.119)	(0.543)	(1.151)	(0.730)
Brisbane	0.166**	0.140**	0.019	0.691	-0.145	2.615**	-0.823	-2.030*	-0.480
	(0.048)	(0.054)	(0.053)	(0.418)	(0.268)	(0.964)	(0.469)	(0.992)	(0.630)
Balance of QLD	0.254**	0.336**	0.064	0.777*	-0.164	2.529**	-0.242	-0.199	0.251
	(0.045)	(0.050)	(0.049)	(0.389)	(0.247)	(0.898)	(0.436)	(0.923)	(0.586)
Adelaide	0.016	-0.222**	-0.068	-0.007	-0.101	2.993*	-0.470	-2.359	-0.212
	(0.070)	(0.079)	(0.078)	(0.605)	(0.394)	(1.396)	(0.679)	(1.435)	(0.911)
Balance of SA	0.193*	0.484**	0.033	0.019	-0.395	0.853	-0.832	-1.848	-0.560
	(0.082)	(0.091)	(0.090)	(0.708)	(0.459)	(1.638)	(0.795)	(1.683)	(1.067)
Perth	0.067	0.066	0.161*	2.279**	0.029	1.505	0.627	0.530	0.818
	(0.066)	(0.073)	(0.072)	(0.570)	(0.364)	(1.316)	(0.640)	(1.352)	(0.860)

	Satisfaction			Mental / emotional Wellbeing			Physical Wellbeing		Social Wellbeing
Predictors	**Satisfaction with home**	**Satisfaction with community**	**Satisfaction with finance**	**Mental health**	**Psychological distress**	**Role-Emotional**	**Vitality**	**Role-Physical**	**Social Functioning**
Balance of WA	-0.047 (0.079)	0.379** (0.089)	0.348** (0.087)	2.636** (0.690)	-0.106 (0.447)	5.063** (1.592)	1.357 (0.775)	0.146 (1.637)	1.638 (1.041)
Tasmania	0.176* (0.081)	0.248** (0.091)	0.091 (0.089)	0.837 (0.692)	0.333 (0.441)	2.389 (1.593)	-0.067 (0.776)	-0.038 (1.639)	0.413 (1.043)
Northern Territory	0.045 (0.080)	0.272** (0.090)	0.300** (0.089)	0.095 (0.700)	-0.333 (0.438)	3.204* (1.616)	-1.215 (0.785)	1.589 (1.660)	-0.520 (1.055)
ACT	-0.078 (0.067)	0.164* (0.075)	0.148* (0.074)	0.696 (0.578)	0.515 (0.367)	1.645 (1.337)	-0.345 (0.648)	-1.097 (1.374)	-1.135 (0.872)
Wave 2	0.042* (0.019)	0.079** (0.021)	0.344** (0.021)	-0.130 (0.162)		-0.616 (0.379)	-0.747** (0.182)	-2.006** (0.390)	-0.853** (0.245)
Wave 3	0.060** (0.019)	0.112** (0.022)	0.369** (0.021)	-0.292 (0.165)		-1.477** (0.384)	-1.013** (0.185)	-2.123** (0.394)	-0.897** (0.249)
Wave 4	-0.035 (0.020)	0.054* (0.022)	0.415** (0.022)	-0.280 (0.167)		-1.690** (0.389)	-1.480** (0.188)	-3.465** (0.400)	-1.553** (0.252)
Wave 5	-0.038 (0.020)	0.053* (0.022)	0.413** (0.022)	-0.319 (0.170)		-1.672** (0.395)	-1.503** (0.191)	-3.699** (0.406)	-1.371** (0.256)
Wave 6	0.002 (0.020)	0.057* (0.023)	0.555** (0.022)	-0.262 (0.172)	-0.603** (0.078)	-1.666** (0.401)	-1.943** (0.193)	-5.060** (0.412)	-1.703** (0.259)
Wave 7	-0.027 (0.021)	0.014 (0.024)	0.502** (0.023)	-0.459* (0.180)		-3.114** (0.418)	-2.367** (0.202)	-6.066** (0.429)	-2.248** (0.271)
Wave 8	0.003 (0.021)	0.020 (0.023)	0.509** (0.023)	-0.043 (0.178)	-0.614** (0.070)	-2.842** (0.415)	-2.272** (0.200)	-6.693** (0.427)	-2.199** (0.269)
Wave 9	-0.046* (0.022)	0.050* (0.025)	0.458** (0.024)	-0.686** (0.186)		-3.976** (0.431)	-3.304** (0.209)	-8.642** (0.443)	-3.759** (0.280)
Wave 10	-0.050* (0.022)	0.099** (0.024)	0.559** (0.024)	-0.521** (0.184)	-0.473** (0.063)	-4.377** (0.427)	-3.218** (0.207)	-9.362** (0.439)	-3.503** (0.277)
Wave 11	0.002 (0.023)	-0.021 (0.025)	0.597** (0.025)	-0.478* (0.192)		-4.698** (0.444)	-3.344** (0.215)	-10.244** (0.457)	-3.927** (0.289)
Wave 12	0.027 (0.022)	-0.076** (0.025)	0.649** (0.024)	-0.517** (0.188)	-0.457** (0.054)	-5.136** (0.435)	-3.595** (0.211)	-11.168** (0.448)	-4.130** (0.283)
Wave 13	0.051* (0.023)	0.061* (0.026)	0.649** (0.025)	-1.040** (0.195)		-6.690** (0.452)	-4.464** (0.218)	-12.829** (0.464)	-5.302** (0.293)
Wave 14	0.005 (0.023)	0.094** (0.026)	0.714** (0.026)	-1.331** (0.197)	-0.106* (0.050)	-7.518** (0.457)	-5.233** (0.221)	-13.458** (0.470)	-6.342** (0.297)

| Predictors | Satisfaction | | | Mental / emotional Wellbeing | | | Physical Wellbeing | | Social Wellbeing |
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role-Emotional	Vitality	Role-Physical	Social Functioning
Wave 15	0.034 (0.024)	0.068* (0.027)	0.753** (0.027)	-1.315** (0.204)		-7.532** (0.474)	-5.211** (0.229)	-14.031** (0.487)	-6.108** (0.308)
Wave 16	0.065** (0.024)	-0.063* (0.027)	0.833** (0.027)	-1.532** (0.207)		-8.706** (0.481)	-5.897** (0.233)	-15.824** (0.494)	-7.203** (0.312)
Wave 17	0.108** (0.025)	0.104** (0.028)	0.850** (0.028)	-1.963** (0.215)		-9.285** (0.500)	-6.277** (0.242)	-15.561** (0.514)	-7.456** (0.324)

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Notes: ** $p < 0.01$, * $p < 0.05$. The reference categories are year 12 and below, full-time employed, Sydney and wave 1. Standard errors are in parentheses

Appendix B2

Table 6.7 (cont'd): Effect of Wellbeing at *t* on Experiencing Precarious Housing at *t*+1, fixed effects logit and OLS model, 2001 – 2018.

	Logit							OLS		
	Tenure Insecurity		**Unaffordable Housing**		**Unsuitable Housing**			**Insecure Neighbourhoods**		
Predictors	**Forced Move**	**OR**	**Unaffordable 30%**	**OR**	**Overcrowded**	**OR**		**Crime**	**Hostility**	**SEIFA – reverse scored**
De facto	0.227** (0.079)	**1.254**	-0.154* (0.062)	**0.857**	0.165 (0.099)	**1.179**		0.034** (0.010)	0.016 (0.009)	0.034** (0.006)
Separated	0.360** (0.110)	**1.434**	0.596** (0.079)	**1.814**	0.022 (0.131)	**1.022**		-0.028 (0.015)	0.004 (0.014)	0.083** (0.009)
Divorced	0.417** (0.119)	**1.517**	0.390** (0.086)	**1.478**	0.124 (0.146)	**1.132**		0.018 (0.015)	0.021 (0.014)	0.076** (0.009)
Widowed	0.238 (0.256)	**1.268**	0.782** (0.148)	**2.185**	0.774** (0.232)	**2.169**		-0.116** (0.018)	0.003 (0.017)	0.051** (0.011)
Single not married	0.101 (0.094)	**1.106**	0.359** (0.072)	**1.432**	0.864** (0.115)	**2.373**		0.008** (0.012)	0.004 (0.012)	0.000 (0.007)
Has long-term health condition	0.069 (0.052)	**1.071**	0.041 (0.037)	**1.042**	0.041 (0.057)	**1.042**		-0.014* (0.005)	-0.004 (0.005)	0.010** (0.003)
Postgraduate	-0.018 (0.234)	**0.982**	-0.765** (0.180)	**0.465**	-1.053** (0.309)	**0.349**		0.026 (0.025)	0.029 (0.024)	0.070** (0.015)
Graduate diploma	-0.309 (0.22)	**0.734**	-0.941** (0.176)	**0.390**	-0.624* (0.295)	**0.536**		0.025 (0.024)	0.031 (0.023)	0.060** (0.015)
Undergraduate	-0.042 (0.119)	**0.959**	-0.384** (0.086)	**0.681**	-0.642** (0.155)	**0.526**		0.085** (0.015)	0.042** (0.015)	0.051** (0.009)
Diploma	0.201 (0.155)	**1.223**	-0.019 (0.118)	**0.981**	-0.186 (0.188)	**0.830**		0.085** (0.019)	-0.022 (0.019)	0.025* (0.012)
Certificate	-0.053 (0.089)	**0.949**	0.116 (0.068)	**1.123**	-0.202* (0.098)	**0.817**		0.054** (0.012)	0.030* (0.012)	0.000 (0.007)
Balance of NSW	-0.111 (0.139)	**0.895**	-0.029 (0.103)	**0.972**	-0.031 (0.182)	**0.970**		-0.117** (0.019)	-0.084** (0.018)	0.412** (0.012)
Melbourne	0.271 (0.17)	**1.312**	-0.362* (0.140)	**0.696**	-0.163 (0.254)	**0.850**		0.066** (0.025)	-0.002 (0.024)	0.093** (0.015)
Balance of Victoria	-0.141 (0.206)	**0.868**	-0.531** (0.153)	**0.588**	-0.398 (0.265)	**0.672**		-0.138** (0.028)	-0.092** (0.027)	0.373** (0.017)
Brisbane	0.109 (0.159)	**1.115**	0.128 (0.127)	**1.137**	-0.652** (0.219)	**0.521**		-0.043 (0.024)	-0.094** (0.023)	-0.007 (0.015)

	Logit							OLS		
	Tenure Insecurity		Unaffordable Housing		Unsuitable Housing			Insecure Neighbourhoods		
Predictors	Forced Move	OR	Unaffordable 30%	OR	Overcrowded	OR		Crime	Hostility	SEIFA – reverse scored
Balance of QLD	0.086 (0.152)	**1.090**	0.210 (0.118)	**1.234**	-0.317 (0.208)	**0.728**		-0.122** (0.022)	-0.089** (0.022)	0.249** (0.014)
Adelaide	0.152 (0.233)	**1.164**	-0.662** (0.193)	**0.516**	-0.674 (0.372)	**0.509**		-0.068 (0.035)	-0.097** (0.034)	0.238** (0.021)
Balance of SA	0.496 (0.293)	**1.643**	-0.301 (0.221)	**0.740**	-0.844 (0.447)	**0.430**		-0.134** (0.041)	0.027 (0.041)	0.411** (0.025)
Perth	0.047 (0.231)	**1.048**	-0.459* (0.191)	**0.632**	-1.265** (0.366)	**0.282**		0.108** (0.033)	-0.048 (0.032)	-0.136** (0.02)
Balance of WA	-0.07 (0.292)	**0.932**	-0.478* (0.233)	**0.620**	0.323 (0.361)	**1.382**		0.027 (0.040)	0.005 (0.039)	0.249** (0.024)
Tasmania	-0.474 (0.267)	**0.623**	-0.294 (0.211)	**0.745**	0.312 (0.445)	**1.366**		-0.137** (0.041)	-0.130** (0.039)	0.311** (0.024)
Northern Territory	-0.319 (0.299)	**0.727**	-0.986** (0.266)	**0.373**	-0.189 (0.358)	**0.827**		0.102* (0.040)	0.249** (0.039)	-0.100** (0.025)
ACT	0.433 (0.249)	**1.542**	0.042 (0.201)	**1.043**	-0.729* (0.353)	**0.483**		-0.041 (0.033)	-0.182** (0.032)	-0.387** (0.020)
Wave 2	-0.093 (0.089)	**0.911**	0.094 (0.071)	**1.098**	-0.133 (0.102)	**0.875**		-0.052** (0.009)	0.006 (0.009)	-0.007** (0.006)
Wave 3	-0.295** (0.094)	**0.745**	0.122 (0.072)	**1.129**	-0.215* (0.104)	**0.807**		-0.100** (0.010)	0.017 (0.010)	-0.008** (0.006)
Wave 4	-0.124 (0.091)	**0.883**	0.121 (0.072)	**1.129**	-0.274** (0.105)	**0.760**		-0.109** (0.010)	0.007 (0.010)	-0.018** (0.006)
Wave 5	-0.283** (0.095)	**0.753**	0.220** (0.073)	**1.246**	-0.307** (0.107)	**0.736**		-0.165** (0.010)	0.010 (0.010)	-0.020** (0.006)
Wave 6	-0.339** (0.098)	**0.712**	0.305** (0.073)	**1.356**	-0.284** (0.108)	**0.753**		-0.173** (0.010)	0.010 (0.010)	-0.027** (0.006)
Wave 7	-0.377** (0.101)	**0.686**	0.408** (0.074)	**1.503**	-0.067 (0.108)	**0.936**		-0.194** (0.010)	0.007 (0.010)	-0.027** (0.006)
Wave 8	-0.252* (0.101)	**0.777**	0.234** (0.077)	**1.264**	-0.167 (0.112)	**0.846**		-0.199** (0.011)	0.008 (0.010)	-0.030** (0.007)
Wave 9	-1.029** (0.118)	**0.357**	0.548** (0.076)	**1.729**	-0.046 (0.112)	**0.955**		-0.212** (0.011)	0.012 (0.011)	-0.022** (0.007)
Wave 10	-0.403** (0.107)	**0.668**	0.405** (0.077)	**1.500**	-0.066 (0.113)	**0.937**		-0.219** (0.011)	0.005 (0.011)	-0.019** (0.007)

| Predictors | Logit | | | | | | | OLS | | |
| | Tenure Insecurity | | Unaffordable Housing | | Unsuitable Housing | | | Insecure Neighbourhoods | | |
	Forced Move	OR	Unaffordable 30%	OR	Overcrowded	OR		Crime	Hostility	SEIFA – reverse scored
Wave 11	-0.412** (0.106)	**0.662**	0.455** (0.077)	**1.575**	-0.195 (0.115)	**0.823**		-0.233** (0.011)	-0.028** (0.011)	-0.020** (0.007)
Wave 12	-0.518** (0.110)	**0.596**	0.376** (0.080)	**1.456**	-0.403** (0.120)	**0.668**		-0.235** (0.011)	-0.030** (0.011)	-0.025** (0.007)
Wave 13	-0.541** (0.115)	**0.582**	0.343** (0.082)	**1.410**	-0.258* (0.122)	**0.772**		-0.277** (0.011)	-0.074** (0.011)	-0.018* (0.007)
Wave 14	-0.345** (0.116)	**0.708**	0.404** (0.084)	**1.498**	-0.208 (0.125)	**0.812**		-0.274** (0.012)	-0.075** (0.011)	-0.021** (0.007)
Wave 15	-0.428** (0.120)	**0.652**	0.462** (0.086)	**1.588**	-0.502** (0.132)	**0.605**		-0.264** (0.012)	-0.089** (0.012)	-0.030** (0.007)
Wave 16	-0.524** (0.125)	**0.592**	0.491** (0.089)	**1.634**	-0.521** (0.135)	**0.594**		-0.263** (0.012)	-0.091** (0.012)	-0.026** (0.008)
Wave 17	-0.500** (0.130)	**0.606**	0.495** (0.092)	**1.641**	-0.490** (0.140)	**0.613**		-0.269** (0.013)	-0.097** (0.012)	-0.022** (0.008)

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Notes: ** *p* < 0.01, * *p* < 0.05. The reference categories are legally married, does not have long term health condition, year 12 and below, Sydney and wave 1. Standard errors are in parentheses.

Appendix C1

Table 7.12 (cont'd): Impact of Precarious Housing Indicators at *t* on Overall Wellbeing at time *t*+1, fixed effects OLS model, 2001 – 2018.

Predictors	Coefficient (Std. Error)
Balance of NSW	0.041* (0.018)
Melbourne	0.035 (0.024)
Balance of VIC	0.054* (0.026)
Brisbane	0.042 (0.022)
Balance of QLD	0.089** (0.021)
Adelaide	-0.001 (0.033)
Balance of SA	0.059 (0.038)
Perth	0.089** (0.031)
Balance of WA	0.166** (0.037)
Tasmania	0.069 (0.037)
Northern Territory	0.068 (0.038)
ACT	0.032 (0.031)
Wave 2	0.016 (0.009)
Wave 3	0.008 (0.009)
Wave 4	-0.015 (0.009)
Wave 5	-0.012 (0.009)
Wave 6	-0.003 (0.009)

Predictors	Coefficient (Std. Error)
Wave 7	-0.037** (0.010)
Wave 8	-0.021* (0.010)
Wave 9	-0.075** (0.010)
Wave 10	-0.058** (0.010)
Wave 11	-0.066** (0.010)
Wave 12	-0.075** (0.010)
Wave 13	-0.102** (0.011)
Wave 14	-0.124** (0.011)
Wave 15	-0.118** (0.011)
Wave 16	-0.151** (0.011)
Wave 17	-0.148** (0.012)

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Notes: ** $p < 0.01$, * $p < 0.05$. The reference categories are Sydney and Wave 2.

Appendix C2

Table 7.13 (cont'd): Impact of Wellbeing at *t* on Overall Housing Precariousness at time *t*+1, fixed effects OLS model, 2001 – 2018.

Predictors	Coefficient (Std. Error)
Balance of NSW	0.007 (0.012)
Melbourne	0.039* (0.016)
Balance of VIC	-0.031 (0.018)
Brisbane	-0.048** (0.015)
Balance of QLD	0.011 (0.014)
Adelaide	-0.042 (0.023)
Balance of SA	0.017 (0.027)
Perth	-0.057** (0.021)
Balance of WA	0.029 (0.026)
Tasmania	-0.089** (0.026)
Northern Territory	-0.005 (0.026)
ACT	-0.128** (0.022)
Wave 2	-0.013* (0.006)
Wave 3	-0.025** (0.006)
Wave 4	-0.028** (0.006)
Wave 5	-0.046** (0.006)
Wave 6	-0.049** (0.006)

Predictors	Coefficient (Std. Error)
Wave 7	-0.048** (0.007)
Wave 8	-0.054** (0.007)
Wave 9	-0.060** (0.007)
Wave 10	-0.049** (0.007)
Wave 11	-0.066** (0.007)
Wave 12	-0.077** (0.007)
Wave 13	-0.097** (0.007)
Wave 14	-0.088** (0.007)
Wave 15	-0.097** (0.008)
Wave 16	-0.100** (0.008)
Wave 17	-0.100** (0.008)

Source: Authors' own calculations from the 2001-2018 HILDA Survey.
Notes: ** $p < 0.01$, * $p < 0.05$. The reference categories are Sydney and Wave 2.

Appendix D1

Table 5.3: Sensitivity Test with Continuous Income Variable - Effect of Tenure Insecurity and other forms of Residential Mobility at *t* on Wellbeing at *t*+1, fixed effects OLS model, 2001 – 2018.

Predictors	Satisfaction			Mental / emotional			Physical		Social
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role - emotional	Vitality	Role - physical	Social functioning
Forced moves	0.046*	-0.032*	-0.211**	-1.092**	0.455**	-1.258**	-0.960**	-0.660	-1.286**
	(0.021)	(0.024)	(0.023)	(0.173)	(0.111)	(0.394)	(0.194)	(0.406)	(0.257)
Housing-related voluntary mobility	0.361**	0.026*	0.070**	0.001	-0.008	-0.307	-0.208	-0.480	-0.040
	(0.013)	(0.015)	(0.014)	(0.108)	(0.007)	(0.245)	(0.121)	(0.252)	(0.160)
Non-housing-related mobility	0.066**	-0.123**	0.017	-0.226*	0.050	-0.534*	0.227	0.399	-0.208
	(0.013)	(0.014)	(0.014)	(0.106)	(0.070)	(0.240)	(0.118)	(0.248)	(0.157)
Anticipated residential mobility	-0.928**	-0.289**	-0.102**	-1.009**	0.284**	-1.162**	-0.595**	-0.109	-0.899**
	(0.010)	(0.012)	(0.011)	(0.087)	(0.056)	(0.198)	(0.097)	(0.204)	(0.129)
Duration at current address (% of age)	-0.005**	0.001**	-0.002**	-0.008**	0.002	-0.015*	-0.009**	-0.019**	-0.010*
	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)	(0.006)	(0.003)	(0.006)	(0.004)
Real Equivalised Household Disposable Income*	0.000**	0.000	0.003**	0.003**	0.000	0.004*	0.003**	0.003	0.004**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)

Source: Authors' own calculations from the 2001-2018 HILDA Survey.
Notes: ** $p < 0.01$, * $p < 0.05$. The control variables are not reported here due to space considerations. Real Equivalised Household Disposable Income is Divided by 1000.

Table 6.4: Sensitivity Test with Continuous Income Variable - Effect of Housing Precariousness at *t* on Wellbeing at *t*+1, fixed effects OLS models, 2001 – 2018.

Predictors	Satisfaction			Mental/Emotional Wellbeing			Physical Wellbeing		Social Wellbeing
	Satisfaction with home	Satisfaction with community	Satisfaction with finance	Mental health	Psychological distress	Role-Emotional	Vitality	Role-Physical	Social Functioning
Forced Move	0.010	-0.090**	-0.070**	-0.177	0.217	-0.775	0.013	0.161	-0.360
	(0.022)	(0.024)	(0.024)	(0.188)	(0.120)	(0.435)	(0.211)	(0.448)	(0.284)
Unaffordable 30%	-0.027	-0.027	-0.086**	-0.419**	-0.011	-0.662*	-0.229	0.025	0.009
	(0.016)	(0.018)	(0.018)	(0.141)	(0.086)	(0.327)	(0.159)	(0.336)	(0.213)
Overcrowded	-0.106**	0.020	-0.048*	-0.254	-0.089	0.639	-0.005	-0.080	-0.082
	(0.022)	(0.025)	(0.025)	(0.197)	(0.121)	(0.458)	(0.222)	(0.470)	(0.297)
Neighbourhood Crime	-0.030**	-0.032**	-0.019**	-0.040	0.032	-0.060	-0.084	-0.060	-0.029
	(0.005)	(0.006)	(0.006)	(0.046)	(0.028)	(0.107)	(0.052)	(0.110)	(0.069)
Neighbourhood Hostility	-0.044**	-0.042**	-0.022**	-0.189**	0.115**	-0.358	-0.167**	-0.232*	-0.283**
	(0.005)	(0.006)	(0.006)	(0.046)	(0.028)	(0.107)	(0.052)	(0.110)	(0.070)
SEIFA Index – reverse scored	-0.102**	-0.048**	0.025**	0.009	-0.003	-0.195	-0.023	-0.359*	-0.172
	(0.008)	(0.009)	(0.009)	(0.068)	(0.043)	(0.158)	(0.076)	(0.162)	(0.103)
Real Equivalised Household Disposable Income*	0.000**	0.000	0.001**	0.001	0.000	0.001	0.001	0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.002)	(0.001)	(0.002)	(0.001)

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Notes: ** *p* < 0.01, * *p* < 0.05. The control variables are not reported here due to space considerations. Real Equivalised Household Disposable Income is Divided by 1000.

Table 6.6: Sensitivity Test with Continuous Income Variable – Effect of Wellbeing at *t* on Experiencing Precarious Housing at *t*+1, fixed effects logit and OLS model, 2001 – 2018.

Predictors	Tenure Insecurity		Unaffordable Housing		Unsuitable Housing			Insecure Neighbourhoods		
	Forced Move	OR	Unaffordable 30%	OR	Overcrowded	OR		Crime	Hostility	SEIFA – reverse scored
Satisfaction with Home	-0.103** (0.008)	**0.902**	0.000 (0.007)	**1.000**	-0.065** (0.010)	**0.937**		-0.021** (0.001)	-0.024** (0.001)	-0.012** (0.001)
Satisfaction with Community	-0.004 (0.009)	**0.996**	-0.015* (0.006)	**0.985**	0.001 (0.010)	**1.001**		-0.013** (0.001)	-0.014** (0.001)	-0.002** (0.001)
Satisfaction with Finance	-0.021* (0.009)	**0.979**	-0.062** (0.007)	**0.940**	-0.021* (0.010)	**0.980**		-0.001 (0.001)	0.000 (0.001)	0.003** (0.001)
Mental Health	-0.027 (0.017)	**0.973**	-0.018 (0.012)	**0.982**	-0.006 (0.018)	**0.994**		-0.009** (0.002)	-0.016** (0.002)	0.004** (0.001)
Role-Emotional	-0.008 (0.006)	**0.992**	0.003 (0.005)	**1.003**	-0.004 (0.007)	**0.996**		0.001 (0.001)	0.001 (0.001)	-0.001* (0.000)
Vitality	-0.024 (0.015)	**0.977**	0.008 (0.011)	**1.008**	0.005 (0.016)	**1.005**		0.000 (0.002)	-0.003 (0.002)	-0.003** (0.001)
Role-Physical	0.017** (0.007)	**1.017**	-0.003 (0.005)	**0.997**	-0.019** (0.007)	**0.981**		-0.001 (0.001)	0.000 (0.001)	0.000 (0.000)
Social Functioning	-0.001 (0.011)	**0.999**	-0.013 (0.008)	**0.987**	0.008 (0.013)	**1.008**		-0.003* (0.011)	-0.005** (0.001)	0.000 (0.001)
Real Equivalised Household Disposable Income*	-0.001 (0.001)	**0.999**	-0.004** (0.001)	**0.996**	-0.004** (0.001)	**0.996**		0.000 (0.000)	0.000 (0.000)	0.000** (0.000)

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Notes: ** *p* < 0.01, * *p* < 0.05. The control variables are not reported here due to space considerations. Real Equivalised Household Disposable Income is Divided by 1000.

Table 7.12: Sensitivity Test with Continuous Income Variable - Impact of Precarious Housing Indicators at *t* on Overall Wellbeing at time *t*+1, fixed effects OLS model, 2001 – 2018.

Predictors	Coefficient (Std. error)
Forced to move	-0.020 (0.010)
Unaffordable 30%	-0.027** (0.008)
Overcrowded	-0.013 (0.011)
Neighbourhood crime	-0.010** (0.002)
Neighbourhood hostility	-0.020** (0.002)
SEIFA index	-0.015** (0.004)
Real Equivalised Household Disposable Income*	0.000** (0.000)

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Notes: ** $p < 0.01$, * $p < 0.05$. The control variables are not reported here due to space considerations. Real Equivalised Household Disposable Income is Divided by 1000.

Table 7.13: Sensitivity Test with Continuous Income Variable - Impact of Wellbeing at *t* on Overall Housing Precariousness at time *t*+1, fixed effects OLS model, 2001 – 2018.

Predictors	Coefficient (Std. error)
Satisfaction with home	-0.024** (0.001)
Satisfaction with community	-0.008** (0.001)
Satisfaction with finance	-0.004** (0.001)
Mental health	-0.009** (0.001)
Role-emotional	0.000 (0.000)
Vitality	-0.002 (0.001)
Role-physical	0.000 (0.000)
Social functioning	-0.002** (0.001)
Real Equivalised Household Disposable Income	0.000 (0.000)

Source: Authors' own calculations from the 2001-2018 HILDA Survey.

Notes: ** $p < 0.01$, * $p < 0.05$. The control variables are not reported here due to space considerations. Real Equivalised Household Disposable Income is Divided by 1000.