INVESTIGATING THE ROLE OF NEIGHBOURHOOD CHARACTERISTICS IN DETERMINING LIFE SATISFACTION

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Executive Summary

- This paper reports on an analysis of life satisfaction data collected as part of the first wave of the Household, Income and Labour Dynamics in Australia (HILDA) Survey. More specifically, the clustered nature of the HILDA sample was used to test the role of neighbourhood effects in accounting for inter-personal differences in self-reported life satisfaction scores.
- A regression model predicting individual differences in life satisfaction was developed and tested for men and women separately. When this model was estimated allowing for fixed neighbourhood effects (based on the Census Collection District in which a sample member resides), strong support for sizeable effects were found. Indeed, observable individual and household characteristics (such as age, sex, employment status and household income) were only found to account for about 12 to 14 per cent of the variation in measured life satisfaction. Of the variance unexplained, close to 10 per cent could be accounted for by unobserved differences across neighbourhoods.
- While identifying the presence and magnitude of neighbourhood effects proved to be relatively straightforward, determining the source of these neighbourhood differences is a very different matter. Essentially, these neighbourhood effects can arise either because individuals in the same neighbourhood tend to behave similarly because they face similar environments or have similar characteristics, or because the behaviour of individuals is affected by the behaviour of other residents of the neighbourhood. Some evidence was uncovered to suggest that the latter type of effect might be relatively more powerful in explaining differences in life satisfaction. Unfortunately, this conclusion is tentative at best, with measurable neighbourhood characteristics only found to have a relatively small impact on the overall explanatory power of the regression models.

1. Introduction

The notion of community is currently very high on the Australian political agenda (see Headey et al., 2002). This is most obviously reflected in the current strategic plan of the Department of Family and Community Services (FaCS), which identifies achieving strong communities as one of the major outcomes for the Department. Such a policy thrust is obviously based on the notion that how communities function has important implications for a range of social and economic outcomes. For example, 'communities that are strong' are expected to deliver more positive outcomes, which include increased employment opportunities, higher rates of social and civic participation, better educational performance by children, lower rates of crime, and improved physical and mental health. Empirical research in support of this hypothesis, especially in Australia, however, has tended to focus on the spatial distribution of incomes and job opportunities (e.g., Gregory and Hunter, 1995; Andrews, Green and Mangan, 2002; Kelly and Lewis, 2002) or of educational outcomes (e.g., Jensen and Seltzer, 2000; Overman, 2000; Jones, 2002). In contrast, to our knowledge there has only been one study in Australia that has directly examined whether subjective measures of well-being, such as the self-reported life satisfaction measures regularly studied by psychologists, are affected by neighbourhood characteristics.

It is this relationship between neighbourhood and life satisfaction that is at the heart of this paper. Specifically, we use data from the first wave of the Household, Income and Labour Dynamics in Australia (HILDA) Survey to develop and fit an empirical model that predicts individual differences in a measure of overall life satisfaction. We then make use of the clustered nature of the HILDA sample to test for the significance of neighbourhood effects. Finally, data from the Population Census are matched to the sample and used to augment our models in an attempt to identify those area characteristics that are most strongly associated with high levels of life satisfaction within neighbourhoods.

Central to our analysis is the definition we adopt for a 'neighbourhood' and how it differs from the notion of 'community'. While communities can take many forms and need not be constrained by distance and geography, it is nevertheless clear that it is attachment to place that has been most important in defining community. This is clearly evidenced by the material reviewed by Gauntlett et al. (2000). While community is defined, following Cox (1995), as a broad concept, the types of interventions reviewed are invariably concerned with changing the

way *local* communities function. It is this focus on local communities that is at the centre of this analysis.

Nevertheless, the problem of how to draw boundaries around local communities remains. For example, is a local community defined by residence in a street, group of streets, suburb or town? Further, does it even make sense to restrict membership of a local community to the residents of that community? What about persons who work or participate in other activities within that locality? We cannot answer these questions with the available data. The data, however, do provide a natural unit for defining localities or, to use the terminology used in this paper, neighbourhoods. Since the sample was clustered into (488) Census Collection Districts (CDs), it makes obvious sense to use that unit to define neighbourhoods. Note that use of the term neighbourhood, rather than community, is deliberate. There is no obvious reason why boundaries drawn by the Australian Bureau of Statistics (ABS) for the purpose of managing the collection of Census data would equate with communities. Furthermore, CDs are small (approximately 250 households on average) and hence, except for a few rural locations, members of the same CD will live in close vicinity to each other; that is, they are clearly neighbours.

A final important consideration for this paper is why we should be interested in subjective measures of well-being in the neighbourhood context. It can reasonably be argued that the principal goal of government should be to enhance the welfare, or utility, of its citizens. The utility of individuals, however, is not directly observable and hence policy-makers have, largely because of the influence of traditional economic theory, tended to rely heavily on the consumption behaviour of households in measuring social welfare (Slesnick, 1998). This type of approach to the measurement of utility, however, is very narrow. It excludes, for example, what Kahneman, Wakker and Sarin (1997) have coined 'experienced utility' and focuses instead on 'decision utility'. The focus on the latter, however, is only justified if people *always* maximise utility, an assumption that is clearly questionable. The traditional economic approach also assumes that individual utility functions are independent, yet everywhere there is evidence that human behaviour is greatly influenced by the utility of others. Indeed, one of the ideas motivating this paper is the possibility that the utility of individuals is affected by the utility of other people who live in the same neighbourhood.

An entirely different approach to that advocated by most economists, and one long utilised by psychologists, is the use of subjective measures of individual well-being. That is, rather than

inferring utility from observed decisions, utility can be evaluated by directly asking individuals how satisfied or happy they are with their lives. As Frey and Stutzer (2002, p. 405) have observed, compared with inferences based on the observed outcomes of decisions, this provides both a more direct and broader measure of utility. Moreover, it is now well accepted that even simple global self-report measures, such as used in this study, generally possess adequate statistical properties. For example, Diener et al. (1999, pp. 277-278) in reviewing the empirical literature on subjective well-being, concluded that such measures exhibit ' … good internal consistency … , moderate stability, and appropriate sensitivity to changing circumstances'. These self-reports have also been found to exhibit strong correlations with other more objective measures, such as the incidence and duration of smiling during social interactions, the likelihood of suicide, heart rate and blood pressure measures of response to stress, and electro-encephalogram measures of pre-frontal brain activity (Frey and Stutzer, 2002, p. 46; Blanchflower and Oswald, 2003). Overall, it is clear that there are powerful arguments for why policy-makers should encourage and exploit research that makes use of subjective measures of well-being.

2. Review of the Literature

While subjective well-being may be an area of research that has tended to be overlooked by policy-makers, it nevertheless is a vast field and has been the subject of literally hundreds of empirical studies (for a review, see Diener et al., 1999). Despite this, the possibility that neighbourhood characteristics might impact on perceptions of well-being remains a much under-studied area. While the potential for external events and situations to influence subjective well-being has long been recognised (e.g., Wilson, 1967), most empirical research has ignored neighbourhood characteristics. Indeed, despite some notable exceptions, neighbourhood effects on subjective well-being were generally only considered in the context of social comparisons (see Michalos, 1985). In this line of reasoning, assessments of subjective well-being depend on comparisons with various standards including other people in the reference person's peer group. The simple prediction from this theory is that respondents will typically report feeling happy if the people around them appear relatively worse off, and relatively unhappy if the opposite. The implication is that living in a neighbourhood where people are relatively unhappy should actually make you feel more satisfied with your life!

There have, however, been very few (if any) attempts to test this theory outside the laboratory. Indeed, the limited empirical research that has been conducted has generally been concerned with identifying whether measures of well-being are associated with specific neighbourhood characteristics. These studies have thus not been concerned with whether people are directly affected by the happiness of others around them, but with whether there are specific neighbourhood characteristics that make all residents of that neighbourhood feel better off (or worse off).

There are two types of approaches that have been pursued here. The first originates with the seminal works of Andrews and Withey (1976) and Campbell, Converse and Rogers (1976). Andrews and Withey (1976), for example, in their national samples of US residents, investigated the relationship between satisfaction with various neighbourhood characteristics (such as safety, local services and the local weather) and overall life satisfaction. While they found sizeable correlations, the impact of their neighbourhood index was relatively small once included in a multivariate model alongside measures of satisfaction with other life domains. Ultimately, Andrews and Withers were led to conclude that of most importance in explaining feelings about general well-being are concerns that are close to self and family (p. 148). More recently, Sirgy et al. (2000) and Sirgy and Cornwell (2002) have revisited the link between satisfaction with neighbourhood and overall life satisfaction, claiming that their data show that neighbourhood features do affect life satisfaction, but through the mediating effects of community satisfaction, housing satisfaction and home satisfaction.

This small body of work, however, has a number of limitations. In particular, the research is concerned only with relationships between variables measuring satisfaction with different aspects of life and, given the tendency to response set bias, there are good reasons to expect them to yield relatively high correlations. More importantly, overall life satisfaction and satisfaction with different life domains are likely to be jointly determined. None of the variables included in this type of analysis can therefore be reasonable assumed to be exogenous.[1]

The second approach involves the construction of proxy measures for the impact of neighbourhood externalities, such as the local unemployment rate, the local area poverty rate or

[1] Furthermore, in the case of the more recent studies, the quality of data must be questionable given both the small sample sizes involved and the poor response rates. Sirgy et al. (2000), for instance, test their hypotheses with data from four samples. The sample sizes were all small, ranging from just 44 to "about" 100. The reported response rates were also low, ranging from just 22 to 32 per cent. The sample used in Sirgy and Cornwell (2002) comprised 380 respondents from an initial sample of around 3000.

the proportion of residents who are university educated, and then including such measures in a model explaining the outcome of interest. This, for example, has been the dominant approach in the growing literature concerned with the impact of neighbourhood externalities on broader socio-economic outcomes, especially of children and young adults (see Ginther, Haveman and Wolfe, 2000).

A number of studies have, for example, investigated relationships between neighbourhood poverty and psychological health, which can be broadly thought of as one component of overall well-being. The results have been mixed. Belle (1990), for example, reported significant positive associations between a measure of depression and poverty among a sample of women. Klebanov Brooks-Gunn and Duncan (1994), on the other hand, in their sample of mothers, could find no association between neighbourhood poverty and depression as assessed by the General Health Questionnaire (GHQ) (though neighbourhood poverty was found to impact adversely on a measure of maternal warmth). Somewhat differently, Aneshensel and Sucoff (1996) constructed a measure of the socio-economic status (SES) of a neighbourhood that included income and poverty components (along with a component measuring the occupational status of the neighbourhood) and tested whether this measure impacted on a range of psychological health outcomes among a sample of adolescents. For three of the four outcome measures there was no evidence of any statistically significant association with neighbourhood SES, other things held constant. They also included a measure of neighbourhood stability (the proportion of households living in the same house for at least five years) and again found no evidence of significant associations. However, significant associations between a measure of ambient hazards within neighbourhoods (based on a subjective assessment of the incidence of various dangers) and all mental health indicators were found. That said, we must be wary about concluding too much from this latter finding. It seems likely that youths experiencing anxiety and depression would be more likely to describe their neighbourhoods as less safe. Finally, in a large sample of adults, Ross, Reynolds and Geiss (2000) found that the impact of poverty interacted with a measure of neighbourhood stability. That is, psychological distress was found to be greatest in poor neighbourhoods characterised by relatively little residential mobility.

Shields and Wheatley Price (2001) have also examined correlates with psychological health (as assessed by the GHQ). Key features of their analysis included use of a large nationally representative data set (the Health Survey for England) and the inclusion of disaggregated

regional measures of relative economic deprivation. They found a non-linear relationship between psychological health and regional economic deprivation, but with the worst outcomes reported by residents in the most deprived regions. They also interacted an unemployment status variable with a measure of regional employment deprivation. A significant positive coefficient was estimated, suggesting that living in areas where the unemployed are concentrated mitigates some of the adverse consequences of unemployment. Shields and Wheatley Price hypothesised that this finding reflected the effect of social norms.[2] Overall, these results are suggestive of the importance of neighbourhood effects. Nevertheless, such conclusions are tempered by the fact that the regions used in the construction of the relative deprivation indices were very large, and certainly much larger than what might reasonably be considered a neighbourhood.

Finally, we are aware of just three studies that have incorporated neighbourhood characteristics in multivariate models of life satisfaction. First, Schulz et al. (2000) used data from an area-based sample of adult residents of Detroit, and reported evidence of significantly higher levels of life satisfaction for residents in low poverty neighbourhoods, though the size of these differentials might still be judged small. Unfortunately, their multivariate analysis was conducted within their poverty area sub-samples, and hence their results did not reveal whether this finding was robust to the inclusion of controls for individual characteristics.

Second, in the only previous relevant Australian study that we are aware of, Evans and Kelley (2002) included neighbourhood variables in models of life satisfaction using pooled data from the numerous rounds of the International Social Science Survey Australia (first conducted in 1984). They constructed and tested two types of measures. First, from 1996 Census data they constructed various measures of neighbourhood characteristics based on the postcode in which the individual resided. Second, from the responses of the individuals surveyed they constructed a range of subjective measures about the neighbourhood. They found little evidence that their postcode-based measures exerted any independent influence on life satisfaction scores. Strong associations, however, were found with some of the subjective measures, with variables proxying the sociability and civility of the neighbourhood both significant and associated with life satisfaction in the expected direction. The number of friends individuals have in the neighbourhood was also found to matter. Overall, however, it is difficult to know what to make

[2] Clark (2003) has reported a similar result using data on GHQ scores collected as part of the British Household Panel Survey.

of these results. A priori there are good reasons to be concerned about the direction of causation between life satisfaction and the subjective measures of neighbourhood characteristics. That is, we might expect individuals who are more satisfied with their lives to also be more likely to describe the neighbourhoods in which they live favourably. Such concerns are thus amplified when there is little evidence that life satisfaction is associated with more objective measures of neighbourhood characteristics. However, it is also true that the objective measures are weak. They relate to postcodes, which may not line up well with what respondents think of as their neighbourhood. Further, the neighbourhood characteristics are all based on 1996 data whereas the life satisfaction data could relate to any time between 1984 and 2001. Thus if neighbourhood characteristics are not stable over time, we would not expect strong associations to be detected.

Very differently, Stutzer and Lalive (2001) attempted to test whether neighbourhood norms with respect to unemployment impacted on reported life satisfaction in their Swiss sample. While they found no evidence that the local unemployment rate impacted on life satisfaction, they did find a role for a measure of social employment norms, proxied by the proportion of people in a community who, at a national referendum, voted in favour of unemployment benefits being cut. Moreover, akin to the results of Shields and Wheatley Price (2001) and Clark (2003) discussed earlier, they also found that living in a community where the social employment norm was weaker helped ameliorate some of the adverse consequences for the unemployed.

However, some caution should be given to interpreting the findings of about the importance of neighbourhood characteristics in determining well-being. This arises due to two possible, but empirically very difficult to distinguish, explanations for why we might observe that individuals belonging to the same group (i.e., neighbourhood) behave similarly or have similar levels of life satisfaction (see Manski, 1993, 1995). These are: (i) the ‘endogenous effect’, where the propensity of an individual to behave in some way varies with the prevalence of that behaviour in the group (contagion); and (ii) the ‘correlated effect’, where individuals in the same group tend to behave similarly because they face similar institutional environments or have similar individual characteristics (e.g., living by the seaside). Moreover, these two different mechanisms by which we might observe clustering of life satisfaction levels in neighbourhoods are likely to have quite different policy implications.

3. Data, Definitions and Sample Characteristics

Data Source

As previously noted, the data used in this analysis come from the first wave of the Household, Income and Labour Dynamics Australia (HILDA) Survey. Described in more detail in Watson and Wooden (2002a), the HILDA Survey is based on similar studies conducted in both Germany and the UK (the German Socio-Economic Panel and the British Household Panel Survey respectively). The HILDA Survey thus involved the selection of a large nationally representative sample of households and then seeking interviews with members of those households. Specifically, a household interview was sought with at least one adult member. Individual interviews were then sought with all household members over the age of 15 years on the 30 June preceding interview. In addition to the collection of data through personal interview, all persons completing a personal interview were also given a self-completion questionnaire which they were asked to return, once completed, either by mail or by handing it to the interviewer at a subsequent visit to the household. Almost all of the interviews were conducted during the period between the 24th August 2001 and 21st December 2001.

A key feature of the sample, and one that is fundamental to the analysis in this paper, is its clustering by locality. Households were selected into the sample by a multi-stage process. First, a random sample of 488 Census Collection Districts (CDs), based on 1996 Census boundaries, was selected from across Australia (each of which consists of approximately 200 to 250 households). Since the vast majority of CDs are very small in spatial terms, households within the same cluster can generally be assumed to belong to the same neighbourhood. Second, within each of these CDs all dwellings were fully enumerated and a sample of 22 to 34 dwellings randomly selected, depending on the expected response and occupancy rates within each area. Third, given dwellings can contain multiple households, rules were devised for the selection of households within dwellings. These rules stipulated that where a dwelling contained three or fewer households, all such households should be sampled. Where there were four or more households occupying one dwelling, all households had to be enumerated and a random sample of three households obtained (based on a predetermined pattern).

After adjusting for out-of-scope dwellings (e.g., unoccupied, non-residential) and households (e.g., all occupants were overseas visitors) and for multiple households within

dwellings, the total number of households identified as in-scope was 11,693. Interviews were completed with all eligible members at 6872 of these households and with at least one eligible member at a further 810 households. The total household response rate was, therefore, 66 per cent.

Within the 7682 households at which interviews were conducted, there were 19,917 people. Of this group, 4790 were under 15 years of age on the preceding 30 June and hence were ineligible for an interview in Wave 1. This left 15,127 persons eligible for a personal interview, 13,969 of who completed the Person Questionnaire. Additionally, of this group, 13,159 (94%) completed and returned the Self-Completion Questionnaire.

As discussed in Wooden, Freidin and Watson (2002), these response rates compare favourably with the rates achieved in the first waves of similar major household panel surveys conducted in other Western nations. They are also well in excess of the rates typically reported in other Australian surveys that have attempted to measure life satisfaction. More importantly, comparison with population benchmark data from ABS sources suggest that the sample has characteristics that are broadly in line with what would have been expected if the sample were truly random. There is, however, at least one major disparity, with residents from Sydney under-represented, a result that Wooden et al. (2002) attribute to both greater difficulties making contact with some Sydney residents (e.g., those in living in high-rise apartments) and a greater reluctance to participate because of time commitments.

Defining Life Satisfaction

Life satisfaction is measured with a single item scored on a 0 to 10 scale. The item was worded as follows:

‘All things considered, how satisfied are you with your life?’

A visual aid in the form of a show card was then used to graphically portray the scale respondents were to use in answering this question. Only the extreme values on the scale were labelled, with a score of 0 described as ‘totally dissatisfied’ and a score of 10 as ‘totally satisfied’.

An almost identical question has been included as part of the German Socio-Economic Panel since its inception, in 1984, and has formed the basis for a number of studies into life satisfaction in that country (e.g., Winkelmann and Winkelmann, 1998; Clark, Georgellis and

Sanfey, 2001, Frijters, Haisken-DeNew and Shields, 2003). The question is also very close to the overall life satisfaction item included in the widely used World Values Survey (Inglehart et al., 2000) and the Euro-Barometer Surveys (Di Tella et al., forthcoming).

A summary of the distribution of responses to the life satisfaction question for the complete sample is provided in Table 1. As can be seen, responses are highly skewed towards high levels of satisfaction, with the modal response being 8, but with almost 40 per cent selecting 9 or 10. Given the possibility of bias as a result of self-selection (i.e., a tendency for the most happy to be more likely to respond), we also report the distribution after weighting the population to reflect established population norms (based on ABS sources).[3] The distribution is almost identical, but with a very small difference at the upper end of the distribution. The impact of any self-selection on measured life satisfaction thus appears to be minimal.

In Table 2 we report mean life satisfaction scores (together with standard deviations) by sex. Again we report both weighted and unweighted figures. Further, we also report means disaggregated by the presence of another adult during the interview. Given the potential for responses to be influenced by the presence of others, especially other family members, it would have been preferable if all interviews had been conducted in private. Interviewers, however, were typically unable to control the interview situation and hence there were many instances (almost 40 per cent of all personal interviews) where other adults were present during the interview.

The figures reported in this table indicate that:

i. consistent with the figures reported in Table 1, weighting the data to population norms has a very small and ultimately negligible impact on mean life satisfaction;
ii. as expected, the presence of another adult during the interview had a small but significant upward impact on responses to the overall life satisfaction question; and
iii. women were slightly more likely to report higher levels of life satisfaction than men, which is somewhat surprising given the widespread evidence of higher rates of mood and anxiety disorders among women (see Nolen-Hoeksema and Rusting, 1999), but is consistent with other recent Australian evidence (see Cummins et al., 2001).

[3] The weights used also correct for variations in the probability of selection arising from the nature of the sampling process (see Watson and Fry, 2002).

4. Statistical Framework

The basic approach to analysing inter-personal differences in subjective well-being used here follows previous treatments of happiness and life satisfaction by economists (e.g., Winkelmann and Winkelmann, 1998; Frey and Stutzer, 2000; Clark, et al., 2001; Frijters et al., 2002; Blanchflower and Oswald, 2003). That is, we begin with a microeconometric life satisfaction function of the form:

$$LS_i = \alpha + \beta' X_i + \varepsilon_i \qquad (1)$$

where LS_i denotes life satisfaction for individual i, X is a vector of known variables thought to influence the life satisfaction of individual i, and ε is a random error term.

To both take account of the clustered nature of the sample, and to allow for neighbourhood effects, we can re-specify equation (1) as an 'effects' model. That is:

$$LS_{ij} = \mu_j + \beta' X_{ij} + \varepsilon_{ij} \qquad (2)$$

where μ_j is a neighbourhood-specific effect that is assumed to be constant across individuals residing in neighbourhood j. This model can then be estimated within either a fixed effects framework (FE), which takes μ_j to be a group-specific constant term, or within a random effects framework (RE), which specifies that μ_j is a group-specific disturbance. The random effects specification, however, involves the potentially unrealistic assumption that the neighbourhood effects are uncorrelated with the covariates (e.g. that individual employment outcomes are not correlated with the local unemployment rate). This latter assumption can be tested for with a simple Hausman test for equality of the parameters between the RE and FE model, which in our case clearly rejects the RE orthogonality assumption (at the one per cent level of significance). Consequently, in this paper we do not presents results from the random effects model.

An additional issue of some importance is the choice of estimator. If the dependent variable is treated as a linear cardinal variable, then the appropriate estimator would be generalised least squares. The variable we use to proxy LS_{ij}, however, clearly does not satisfy these requirements and is ordinal in nature and truncated at 0 and 10. Further, its ordinal nature means that little significance can be attached to the unit distance between the set of observed values on the 11-point scale. This suggests the use of either the ordered probit or ordered logit model, which were specifically developed for such situations. The coefficients from these ordinal

non-linear models, however, are more difficult to interpret and hence we continue to place emphasis on the results from least squares estimation. In practical terms, the main results are little affected by this decision. To allow for this comparison, we also provide the corresponding estimates from an ordered probit model of life satisfaction in Appendix Table A2.

In addition, because of the possibility of confusing intra-household effects with neighbourhood effects, since members of the same household are obviously also residents of the same neighbourhood, all models are estimated separately for men and women.[4] This, of course, does not entirely eliminate intra-household effects. Nevertheless, restricting the data set so that no more than one male (or female) is included from each household had little influence on the results.

While the fixed effects approach enables us to establish the quantitative importance of neighbourhoods in determining life satisfaction, it is of only limited use when assessing the implications for policy because it does not provide any information about the particular characteristics of neighbourhoods that are welfare enhancing. We, therefore, also report the results from a number of regressions that include direct measures of the characteristics of neighbourhoods. That is, we estimate the following regression model:

$$LS_i = \alpha + \beta' X_i + \delta' Z_i + \varepsilon_i \qquad (3)$$

where Z_i is a vector of directly measured neighbourhood characteristics. Note that we cannot explicitly also allow for fixed effects in this model given that the neighbourhood characteristics are invariant across all individuals within a neighbourhood.

Control Variables

The composition of the vector of control variables, X, was determined largely on the basis of the types of variables included in recent studies by economists into the determinants of life satisfaction that have employed large national data sets (e.g., Clark and Oswald, 1994; Frey and Stutzer, 2000; Frijters et al., 2003; Helliwell, 2002; Di Tella, McCulloch and Oswald, forthcoming), which themselves build upon a large psychology literature. We thus included a large number of variables to capture individual and family characteristics, employment

[4] Moreover, there are good reasons to expect that the self-reported life satisfaction of men and women may be sensitive to different influences. For example, given paid employment is, on average, more central to the lives of men than women, then we might expect that unemployment would have a larger detrimental impact on the well-being of men than of women.

characteristics, household income and other sources of individual heterogeneity. Each of the control variables included in the analysis are now briefly described. Means and standard deviations for all of the variables included in the analysis are reported in Appendix Table A1.

Age. While the review by Diener et al. (1999) concluded that there is no systematic pattern of association between age and life satisfaction measures, most recent studies employing large nationally representative data sets have reported u-shaped patterns (e.g., Clark and Oswald, 1994; Clark et al., 2001; Frijters et al., 2002; Helliwell, 2002; Di Tella et al., forthcoming). Following these previous studies, we thus specified age as a quadratic.

Marital status. Cross-section research has also consistently found that married persons report being happier and more satisfied with their lives than unmarried persons (Diener et al., 1999). More recently, research in both the US and Australia has reported that unmarried persons who cohabit report being more satisfied with their lives than single persons, but are still not as happy as married persons (Kurdek, 1991; Stack and Eshleman, 1998; Marks and Fleming, 1999). We thus included dummy variables that distinguish six marital states – married, cohabiting (but not married), separated, divorced, widowed and never married (the control group).

Family characteristics. In addition to marital status, we also included controls for other family characteristics. Specifically, we included measures of both the number of own children in the household who are under 15 years of age and the number of adults. In addition, we included a separate control for lone parents, a group of large policy interest in Australia. A priori, the effects of children are uncertain. To the extent they confer utility on parents, we would expect children to enhance life satisfaction. On the other hand, children are costly and are often the source of considerable anxiety and stress, which can be expected to reduce life satisfaction. Research in other Western nations suggests that the latter effect dominates (Clark and Oswald, 1994; Clark et al., 2001; Frijters et al., 2002; Di Tella et al., forthcoming).[5] Lone parents, on the other hand, are expected to be unambiguously less happy given the greater difficulties they are likely to experience juggling both family and income-earning responsibilities.

Race / country of birth / English language ability. It is common practice to include controls for race (e.g., Clark and Oswald, 1994; Blanchflower and Oswald, 2003) or whether born

[5] Interestingly, Frijters et al. (2002) found that, unlike their West German counterparts, among East Germans, children have a welfare enhancing effect.

overseas (e.g., Frey and Stutzer, 2000; Frijters et al., 2002).[6] We thus included controls for both whether an Aboriginal or Torres Strait Islander and whether born overseas. Further, and in line with research into immigrant labour market outcomes (see Wooden, 1994), we distinguished between immigrants born in one of the main English-speaking countries and those born elsewhere. In addition, we also included a measure of English language ability. It is widely acknowledged that English language ability is vitally important for successful integration into many elements of Australian society (see VandenHeuvel and Wooden, 1999) and hence we expected poor English skills to be inversely associated with life satisfaction.

Health and disability. Occasionally, subjective self-assessed measures of health are included in life satisfaction models (e.g., Helliwell, 2002). We, however, are concerned that responses to such measures are likely to be influenced by well-being. That is, very happy people are likely to be more positive about their state of health. We did, however, include controls for whether someone is suffering from a long-term health condition or disability, which we can expect will be exogenous. Further, we also distinguished the severity of those conditions on the basis of responses to a question asking respondents to indicate the extent to which those conditions affected the ability to undertake work. Serious conditions are those where no work is possible while minor conditions are those where is no impact on the amount or type of work that can be done. We acknowledge, however, that the subjective nature of such responses is likely to mean the presence of considerable measurement error, which would introduce bias into our estimated coefficients.

Education. It is also common to include measures of educational attainment in models of subjective well-being, though associations are often small and sensitive to model specification (and especially to the inclusion of occupation and income variables). In this analysis we included a series of dummy variables for different levels of education attainment.

Employment status. One finding in the subjective well-being literature on which there is near universal consensus is that unemployment is associated with lower levels of life satisfaction. Inverse correlations between mental health and unemployment have been well documented (see, for example, Feather, 1990). Moreover, the evidence from recent panel studies suggests that unemployment is associated with subsequent declines in life satisfaction and other measures of

[6] Somewhat differently, Shields and Wailoo (2002) used data (for Britain) that enabled the identification of ethnicity.

well-being (e.g., Gerlach and Stephan, 1996; Korpi, 1997; Winkelmann and Winklemann, 1998; Marks and Fleming, 1999; Clark et al., 2001; Frijters et al., 2001). In this study we thus distinguished the employed from the jobless. However, we went further by, among the employed, distinguishing between the self-employed, owner managers[7] and employees, and among the latter, between those in full-time jobs (the control group) and those in part-time jobs. Further, among the jobless we distinguished those who were unemployed and looking for work from those who were not looking for work, and among the latter, between those who had retired from the workforce, those who were full-time students, those who were permanently sick and other non-participants in the labour market.

Employment norms. We also tested for the presence of effects from social employment norms. That is, we included an interaction term between unemployment status and the local unemployment rate. The earlier research suggests that this variable will be negatively signed, indicating that the negative impact of unemployment on well-being is lessened in areas of relatively high unemployment. Shields and Wheatley Price (2001), Stutzer and Lalive (2001) and Clark (2003) all argue that such results reflect social norms, with unemployment being more socially acceptable in areas where unemployment is more widespread. An alternative explanation is that social services that cater to the needs of the unemployed are more likely to be found in high unemployment areas.

Household income. Another issue on which there is consensus is the relationship between income and subjective well-being. Well-being is generally found to rise with income, but the size of the associations is usually judged to be relatively small (Diener and Biswas-Diener, 2002). In line with previous research (e.g., Winkelmann and Winkelmann, 1998; Frijters et al., 2001), we included a measure of gross household income specified in log form, thus allowing the effects of income on satisfaction to decline with income. One problem with the HILDA data, however, is that there are a relatively large number of missing cases on income. According to Watson and Wooden (2002b) an estimate of total household gross income can only be derived in 71 per cent of cases. This is a result of both missing data on some income components and non-respondents within households. To avoid the problems that would result from deleting all observations with missing data, we set income for all missing cases to $1 and included a dummy variable

[7] By owner managers we mean persons who work in their own incorporated business. Persons who work in their own unincorporated businesses are classified as self-employed. While this distinction may seem semantic, it is worth noting that the ABS treats owner managers as ‘employees’.

representing cases where household income is missing (or negative). Given the likelihood of missing data is positively correlated with household size, we expected this variable to be positively signed.

Home ownership. While likely to be correlated with income, some studies have also included controls for home ownership (e.g., Clark et al., 2001). This would seem of particular significance in Australia given the popular portrayal of home ownership as the achievement of 'the great Australian dream'. We thus distinguished persons living in households where at least one of the members owns the home from others where the home is either rented or occupied on a rent-free basis.

Interview situation. As noted earlier, there may be an upward bias in life satisfaction scores for persons who were interviewed in the presence of other household members. We thus also included a dummy variable to control for this bias.

Individual heterogeneity. There is an extensive body of psychological research that has established that the most important sources of differences in subjective well-being lie in personality traits (see Diener and Lucas, 1999). Ideally, therefore, we would also control for differences across individuals in personality traits. No direct measures of personality, however, are available, in the HILDA Survey. Nevertheless, in order to capture some of the individual heterogeneity, we also included the following four variables:

(i) the self-assessed importance of religion to the individual;

(ii) the degree of suspicion about the interview (as assessed by the interviewer);

(iii) the length of time horizon for savings and investment decisions;[8] and

(iv) whether the respondent was living with both of their own parents at age 14.

Note that we make no claims about the causal links between these variables and life satisfaction. Note further that the lack of any direct measures for personality only presents serious problems for this analysis if personality is strongly correlated with place of residence, and there is no reason to suppose that this would be so, especially given personality traits are largely a function of genetic factors.

[8] This item comes from the self-completion questionnaire. To avoid omitting cases where this instrument was not returned, we also include a simple dummy variable identifying non-response on this item. If happier people are more likely to cooperate with surveys, then this variable could be expected to attract a negatively signed coefficient.

Neighbourhood Characteristics

The neighbourhood characteristics included in the vector *Z* were derived from three sources. First, we distinguished locations according to both State and remoteness. Remoteness is based on the Accessibility / Remoteness Index for Australia (ARIA) developed by the National Key Centre for Social Applications and used by the ABS (see ABS, 2001a). ARIA essentially provides a measure of how far localities are from population centres where people can access goods, services and opportunities. Following the ABS, we classified all CDs into four bands according to their ARIA scores – major cities, inner regional Australia, outer regional Australia and remote Australia.[9]

Second, we used data from the 1996 Population Census to derive CD-specific characteristics.[10] The variables selected were the:

(i) unemployment rate;[11]

(ii) percentage of the population who are lone parents;

(iii) percentage of the population who are born overseas but not in one of the main English-speaking countries (i.e., immigrants from a non-English-speaking background [NESB]);

(iv) a measure of median weekly household income (scored on a 1 to 6 ordinal scale);[12]

(v) dwellings which are owner- or purchaser-occupied as a percentage of all private dwellings;

(vi) percentage of the population with qualifications who have a higher degree;

(vii) percentage of the employed population aged 15 years or over working in a professional occupation in their main job;

(viii) percentage of the population who are male; and

(ix) percentage of the population aged 65 years or over.[13]

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[9] There are a further two bands – very remote Australia and migratory areas. None of the CDs selected in the HILDA sample fall into these bands.

[10] These data come from C*ensus of Population and Housing: CDATA 1996,* ABS product no. 2019.0.30.001. Note that while the HILDA data were collected in 2001, suggesting that use of 2001 Census data would have been more appropriate, the HILDA sample was designed using 1996 Census boundaries, and hence matching respondents to the 2001 Census would have been extremely difficult in some cases.

[11] As is well recognised, compared with the Labour Force Survey (LFS), the Census uses a far more limited set of questions to determine labour force status. As a consequence the unemployment rate derived from the Census is not directly comparable with estimates produced from the LFS (see ABS, 2001b).

[12] The information on household income available in C-Data is clustered into 6-bands: $120-299; $300-$499; $500-699; $70-999; $1000-1499; and $1500-1999. We thus only know into which broad band the median household income within a CD lies.

Third, we constructed measures of neighbourhood characteristics by aggregating responses across CDs to questions asked in the HILDA Survey about the local neighbourhoods in which respondents reside. Based on a similar question occasionally included in both the British Social Attitudes Survey and the International Social Science Survey for Australia (IsssA), respondents were asked to rate the frequency with which they observe different types of events and behaviours occurring in their 'local neighbourhood'. These events and behaviours were as follows:

(i) neighbours helping each other out;
(ii) neighbours doing things together;
(iii) loud traffic noises;
(iv) noises from airplanes, trains or industry;
(v) homes and gardens in bad condition;
(vi) rubbish and litter lying around;
(vii) teenagers hanging around the streets;
(viii) people being hostile or aggressive;
(ix) vandalism and deliberate damage to property; and
(x) burglary and theft.

Responses were scored on a 5-point labelled scale, ranging from 1, 'never happens', to 5 'very common'. In addition, a 'don't know' response option was also provided, though such cases are not used in the construction of neighbourhood averages.[14]

A Principle Components Analysis (PCA) was then undertaken to check for the degree of communality between items, and three clear factors emerged which appear to measure the degree of social interaction within a neighbourhood (items i and ii), the degree of amenity provided by that neighbourhood (items iii through vi), and the extent of incivility within the neighbourhood

[13] An alternative approach might have been to use the scores on the SEIFA variables derived by the ABS (1998), which are intended to measure the extent of economic and social advantage / disadvantage of small areas. We thus re-estimated our basic equation after replacing our measures of neighbourhood characteristics with a set of dummies indicating an area's decile ranking on the Index of Relative Socio-Economic Disadvantage. These dummy terms, however, were jointly insignificant on both the male and female equations and the explanatory power of these specifications were inferior to the models reported in Table 6. Consequently, we have chosen not to report these results here.

[14] The incidence of 'don't know' responses ranged from one per cent (for rubbish and litter lying around) to 11 per cent (for neighbours helping each other out) of the sample.

(items vii through x).[15] We thus constructed three additive scales based on this clustering of items.[16] The means of these three variables were then summed over each individual in the CD, and the average score attributed to all members of the CD. These additional aggregated variables were then included as explanatory variables in our later empirical models.

5. Results

The regression results are presented in Tables 3 through 6. Table 3 provides two sets of estimates for the male sub-sample. The first is the basic model and includes all individual controls but no neighbourhood controls (equation 1), and is estimated with ordinary least squares. The second specification allows for neighbourhood fixed effects (equation 2) and is estimated with generalised least squares. Table 4 presents the equivalent set of results for the female sub-sample. In Tables 5 and 6 we present results from estimating specifications that replace the fixed effects with our measures of specific neighbourhood characteristics (equation 3). Three specifications are reported. The first includes the complete set of variables derived from the Population Census. The second specification refines this analysis by using PCA to deal with the high levels of collinearity between the different Census-based neighbourhood variables. Specifically, it is found that the nine variables can be aggregated into three factors: one is dominated most heavily by household income, education and occupation; the second is dominated by the unemployment rate, the lone parent proportion and the incidence of immigrants; and the third is dominated most heavily by the gender and age composition variables. The third and final specification replaces the Census variables with the three neighbourhood variables derived from the HILDA Survey instruments. For reasons of brevity, in Tables 5 and 6 we only report the coefficients on the neighbourhood variables.

Turning to the results of the basic model, the first point to note is that most of the coefficients are in line with both expectations and previous research. Age, for example, exhibited the u-shaped relationship with life satisfaction found in multivariate research employing large samples. The magnitudes of the estimated coefficients indicate that dissatisfaction is greatest

[15] As noted earlier, Evans and Kelley (2002) constructed similar scales from their IsssA data. All of their measures, however, were constructed at the level of the individual, rather than the area or neighbourhood, and hence are unlikely to be exogenous to the level of reported life satisfaction.

[16] The reliability of all three scales was reasonably high, with Cronbach alphas of 0.83, 0.65 and 0.85, respectively.

when people are in their early 40s. Similarly, like most previous studies, these results confirmed the positive association between marriage and life satisfaction. Also as expected, separated persons are found to be more dissatisfied than divorced persons, a finding which is generally thought to reflect adaptation. Divorced persons have typically had more time to adjust to their changed circumstances than have separated persons. Lone parenthood is also inversely associated with life satisfaction, though the size of this relationship is only significant for women. The presence of young children, on the other hand, exerted a greater depressing effect on life satisfaction among men.

One unexpected finding is the coefficient on the indigenous identifier. Other things held constant, Aboriginal and Torres Strait Islanders score higher on the life satisfaction scale than non-indigenous people. Moreover, the size of the effect is, among men at least, relatively large, at just over 0.4 of a point (on the 11-point scale). Among indigenous women, the size of the differential is much smaller, but still statistically significant.

Immigrants from a non-English-speaking country, on the other hand, exhibit the expected negative association with life satisfaction. Moreover, this dissatisfaction is much greater if English language ability is assessed as poor or very poor.

Our health indicators, while relatively crude in their construction, also perform as expected, with large negative coefficients found for persons with long-term health conditions and disabilities. Further, the size of this differential rises markedly with the degree of severity of those conditions.

The effects of education are reasonably small. Nevertheless, they all point to relatively low levels of satisfaction among the most educated, possibly the result of high aspirations that have yet to be met (Clark and Oswald, 1994).

Turning to employment status, our results are in line with previous research, with levels of satisfaction lowest among the unemployed. Moreover, the effect is large. Compared with male employees in full-time jobs (the control group), unemployed males were, on average, 0.7 of a point lower on the satisfaction scale. Among women the magnitude is smaller but still considerable – 0.5 of a point. Note, however, that the employed do not fare best. Instead, the happiest are persons not working but also not looking for work, such as the retired, full-time students and among women, other non-participants in the labour market (such as house wives). Further, the differences in satisfaction between those in full-time jobs and those in part-time jobs

are relatively small. We also find that unemployed men report feeling comparatively better off when living in areas of high unemployment, which we take as evidence of social employment norms. This effect, however, is only present for men. Unemployed women appear to derive no benefits to their well-being from residing in areas of high unemployment.

Our results also suggest that income does matter, though again the size of the coefficients suggests that the effect is relatively small and that very large increases in income are required to raise life satisfaction scores by even one point on the scale. For example, a doubling in gross household income from $50,000 per annum to $100,000 per annum would only raise life satisfaction of both men and women by 0.04 of a point.

Of the other controls, the findings mostly accord with intuition. Persons who are renting are relatively less satisfied with their lives, while more religious people are relatively more satisfied. Persons who are more forward looking in their planning are also more satisfied, and the effect is most pronounced among women. We also found that persons who lived with both their parents at age 14 are more satisfied (though the effect is far more pronounced for men than women). It was also found that suspicion about the survey was inversely correlated with life satisfaction, though this result was only significant for male respondents. Finally, and as expected, the presence of another adult during the interview was found to bias satisfaction scores upwards by between 0.13 and 0.18 of a point.

The second point about these results that should be noted is that despite the extensive range of controls included in the model, we are still only explaining between 12 and 14 per cent of the variation in the dependent variable. This is not particularly surprising and is consistent with the view that by far the most important predictors of variations across individuals in well-being are personality traits, which are not well measured in the HILDA Survey data. Indeed, according to one recent study, the effect of a person's genes accounts for around one half of the variance in immediate subjective well-being scores and around 80 per cent of the long-term variance (Lykken and Tellegen, 1996).

The third point to note is that the results are relatively robust to the estimation method chosen. Comparing the ordinary least squares results for the basic model (reported in the first set of columns of Tables 3 and 4) with the comparable set of ordered probit results (reported in Table A2) reveals qualitatively few differences. Signs on coefficients do not change, and tests of

statistical significance only produce different results for those variables at the margin of significance.

Turning our attention now to the effects of place, the fixed effects estimation suggests that where you live does seem to matter. This is reflected in the size of the rho parameter, which provides an estimate of the extent of the variation in the error term that is due to unobserved differences across CDs. For both the male and female equations the estimated value of rho is approaching 0.1, which means that about 10 per cent of the variation in the error is due to unobservable differences across CDs. While this may not seem a lot, it needs to again be borne in mind that our basic model only explains 12 to 14 per cent of the variation in life satisfaction. In this framework, therefore, accounting for variations in life satisfaction across people living in different neighbourhoods raises the explanatory power of our equations by close to 70 per cent for men and about 55 per cent for women.

We next attempted to identify the set of neighbourhood characteristics that might help explain these neighbourhood effects. The results are summarised in Tables 5 and 6. Focusing first on the specification containing the Census variables, we can see that for both men and women, living in a neighbourhood where there are relatively high proportions of lone parents and of immigrants is associated with a significantly lower level of life satisfaction. None of the other Census-based variables are significant in this respect. There is, however, a high degree of collinearity between these Census variables, suggesting the need for combining these variables in some way. We did this by using the factor scores produced by a principal components analysis. This analysis, however (the second set of results reported in Tables 5 and 6), added little to our understanding of neighbourhood effects, and certainly did not enhance the model's explanatory model.

These specifications also included controls for both State and distance from the major cities.[17] For both men and women, and in both specifications, a significant independent contribution was exerted by these location variables, and more specifically, by the remoteness variables. Life satisfaction levels were found to be around 0.2 to 0.4 points higher, depending on the specification used, for persons living in areas that are the furthest from metropolitan Australia – that is, persons living in outer regional and remote Australia. Such results thus appear

[17] In the ARIA index, the major cities are the five mainland capitals as well as Canberra, Newcastle, Wollongong, Gosford and the Gold Coast region.

to suggest that, on balance, residents in rural and regional Australia perceive themselves to be better off than their urban counterparts. It needs to be recognised, however, that this result holds constant differences across individuals in both income and labour force status, and the level of average household income is lower, and the rate of unemployment higher, in non-urban locations.

The third and final specification reported in Tables 5 and 6, where we replace the neighbourhood variables derived from the Census with three measures derived from the HILDA data, adds little to the overall explanatory power of the model. Nevertheless, it does provide one interesting and potentially important insight. Of the three neighbourhood characteristics variables included, only one – the social interaction scale – attracts a coefficient that is both large, with the predicted sign, and statistically significant. These results thus suggest the conclusion that life satisfaction is less likely to be influenced by objective features of the neighbourhood environment (such as noise levels and the amount of visible litter), and more likely to be influenced by the degree of positive social interaction that occurs at the neighbourhood level. However, without data on a more complete set of neighbourhood characteristics, we would not want to push such a conclusion too far.

6. Conclusions

Recent years have seen a growth in interest by economists in the economic and social determinants of life satisfaction and happiness. In particular, studies using both cross-sectional and panel data have found a strong adverse relationship between measures of subjective well-being and unemployment, but only modest associations with income measures. In this paper we have attempted to contribute to this literature by investigating the importance of neighbourhood effects in explaining variations in life satisfaction. This is a difficult issue to address due to the practical problems in empirically distinguishing between the roles of exogenous characteristics of the neighbourhood (e.g., living by the seaside) and spillover or endogenous effects whereby the presence of some satisfied people raises the satisfaction of their neighbours (Manski, 1993, 1995).

Overall, the results of the analyses presented in this paper suggest that where you live does play a significant role in determining your life satisfaction. Moreover, the size of this effect is not small, at least not when compared with the magnitude of other variables generally thought to be

of importance in explaining variations across individuals in subjective well-being, such as labour force status, health and income. What we cannot say from this type of analysis, however, is the extent to which these differentials across neighbourhoods are due to the

We have attempted to tease out the role of exogenous neighbourhood characteristics, such as the extent of unemployment within the neighbourhood, average household incomes and ethnic concentration and diversity, through the use of area-based Census data that we matched to the HILDA sample. For the most part, these variables exerted only a small impact on measured life satisfaction. It cannot, however, be concluded that exogenous neighbourhood characteristics are unimportant. All we can conclude is that observable characteristics such as the local unemployment rate and the demographic composition of a neighbourhood are relatively unimportant. It may be other characteristics, such as the beauty of the local environment, noise levels or the quality of government services that matter most.

Very differently, we did uncover evidence that endogenous spillover effects matter, with a variable measuring the degree of social interaction within a neighbourhood being positively and significantly associated with life satisfaction. This variable, however, still only accounts for a small fraction of the total neighbourhood effect, and the possibility that it is picking up some other exogenous neighbourhood characteristic cannot be discounted.

Separating these exogenous and endogenous neighbourhood effects thus clearly requires much more extensive data about neighbourhoods, and even then there are good reasons to be sceptical about the power of survey data to discriminate between these two types of effects (see Manski, 1993, 1995). As future waves of the HILDA survey become available for analysis, we hope to be able to provide additional insights into the actual mechanism by which neighbourhoods influence residents' life satisfaction by being able to follow those who move residential location.

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Table 1: Overall Life Satisfaction: Distribution of Responses

Response	*Unweighted*		*Weighted*	
	N	*%* *(of valid N)*	*N*	*%* *(of valid N)*
0	38	0.3	42456	0.3
1	31	0.2	32049	0.2
2	79	0.6	83989	0.6
3	123	0.9	133417	0.9
4	192	1.4	210047	1.4
5	737	5.3	793415	5.3
6	838	6.0	923969	6.1
7	2387	17.1	2662915	17.6
8	4132	29.6	4466742	29.6
9	2676	19.2	2861904	19.0
10	2718	19.5	2888406	19.1
Don't know / not stated	18		20233	
Total	13969		15119543	

Table 2: Overall Life Satisfaction: Sample and Population Means (and Standard Deviations) by Sex and Whether Another Adult Present at Interview

	Men	*Women*	*All persons*
Unweighted			
Other adult present	8.077 (1.626)	8.185 (1.658)	8.129 (1.642)
No other adult present	7.767 (1.699)	7.918 (1.656)	7.851 (1.627)
Total	7.901 (1.675)	8.015 (1.661)	7.961 (1.670)
Weighted			
Other adult present	8.059 (1.625)	8.160 (1.659)	8.107 (1.642)
No other adult present	7.748 (1.694)	7.914 (1.650)	7.835 (1.672)
Total	7.883 (1.671)	8.007 (1.657)	7.945 (1.665)

Notes: The figures in parentheses are standard deviations.
The totals include a small number of cases where the presence of another adult at the interview was not recorded.

Table 3: The Determinants of Life Satisfaction for Males in Australia: OLS estimates

Explanatory variables	*Basic*		*Fixed Effects*	
	β	*t-stat*	β	*t-stat*
Age	-0.058	-7.49	-0.063	-7.82
Age-squared /100	0.068	8.39	0.072	8.54
Married	0.449	6.11	0.468	6.09
Co-habiting	0.349	4.26	0.322	3.77
Separated	-0.343	-2.51	-0.220	-1.55
Divorced	-0.168	-1.51	-0.131	-1.13
Widowed	0.018	0.11	0.107	0.61
Lone-parent	-0.158	-0.74	-0.173	-0.78
Number of children	-0.072	-3.12	-0.078	-3.25
Number of adults in household	0.028	1.16	0.035	1.34
Aboriginal / Torres Strait Islander	0.408	2.52	0.483	2.81
Immigrant (English speaking country)	0.062	1.00	0.064	0.98
Immigrant (non-English speaking country)	-0.208	-3.08	-0.098	-1.33
Poor English language speaking ability	-0.389	-3.60	-0.325	-2.77
Severe long-term health condition	-1.104	-5.85	-1.125	-5.69
Moderate long-term health condition	-0.647	-10.61	-0.622	-9.76
Slight long-term health condition	-0.251	-3.40	-0.259	-3.37
Degree or higher	-0.256	-3.99	-0.222	-3.13
Diploma	-0.188	-2.38	-0.141	-1.70
Certificate level 3 or 4	-0.020	-0.37	-0.016	-0.28
Certificate level 1 or 2	-0.135	-1.55	-0.134	-1.48
Year 12 only	-0.168	-2.36	-0.111	-1.49
Education level unknown	0.133	0.85	0.175	1.07
Self-employed	-0.047	-0.68	-0.120	-1.67
Owner manager	0.053	0.59	0.042	0.44
Employee part-time	0.000	0.00	-0.055	-0.68
Unemployed	-0.692	-3.87	-0.641	-3.37
Unemployed * unemployment rate	0.037	2.94	0.032	2.35
Permanently sick	-0.221	-2.23	-0.298	-2.88
Retired	0.119	1.25	0.112	1.13
Full-time student	0.244	2.12	0.281	2.33
Other non-participant	0.163	1.35	0.103	0.82
Log household income	0.051	1.75	0.076	2.36
Household income missing	0.504	1.57	0.756	2.17
Negative household income	0.457	1.09	0.778	1.74
House renter	-0.277	-5.54	-0.259	-4.67
Rent free	-0.196	-1.48	-0.308	-2.15

Table 3 (continued)

Explanatory variables	*Basic*		*Fixed Effects*	
	β	*t-stat*	β	*t-stat*
Religion is important (0-10)	0.048	8.39	0.048	7.97
Suspicious of interview questions	-0.222	-2.51	-0.248	-2.63
Savings time horizon (1-6)	0.044	3.20	0.045	3.10
Savings time horizon missing	-0.122	-1.53	-0.098	-1.15
Others present during interview	0.130	3.10	0.150	3.34
Lived with both parents aged 14	0.177	3.17	0.162	2.78
Constant	7.938	22.08	7.759	20.14
Sample (observations)	6594		6594	
Sample (groups)	-		488	
Average observations per group	-		13.5	
R-squared (within)	-		0.116	
R-squared (between)	-		0.171	
R-squared (overall)	0.126		0.125	
Rho (fraction of variance due to group effect)	-		0.095	
Hausman test (random versus fixed effects)	-		72.55 (p=.003)	

Note: Omitted categories are single with no children, native-born (non-ATSI), fluent English language speaking ability, no long-term health condition, no qualifications, full-time employment, owner/mortgage, not suspicious about interview questions, no others present during interview, and did not live with both parents at age 14.

Table 4: The Determinants of Life Satisfaction for Females in Australia: OLS estimates

Explanatory variables	*Basic*		*Fixed Effects*	
	β	*t-stat*	β	*t-stat*
Age	-0.044	-6.42	-0.045	-6.49
Age-squared /100	0.053	7.61	0.055	7.57
Married	0.318	4.47	0.303	4.11
Co-habiting	0.172	2.19	0.182	2.25
Separated	-0.534	-4.54	-0.554	-4.60
Divorced	-0.095	-0.97	-0.066	-0.66
Widowed	0.202	1.92	0.187	1.73
Lone-parent	-0.410	-4.38	-0.349	-3.62
Number of children	-0.038	-1.72	-0.057	-2.49
Number of adults in household	0.022	0.95	0.007	0.29
Aboriginal / Torres Strait Islander	0.276	2.17	0.295	2.22
Immigrant (English speaking country)	0.096	1.58	0.114	1.78
Immigrant (non-English speaking country)	-0.231	-3.66	-0.158	-2.34
Poor English language speaking ability	-0.593	-5.97	-0.530	-5.06
Severe long-term health condition	-1.309	-6.28	-1.279	-5.96
Moderate long-term health condition	-0.766	-13.73	-0.747	-12.96
Slight long-term health condition	-0.172	-2.14	-0.163	-1.97
Degree or higher	-0.260	-4.67	-0.210	-3.52
Diploma	-0.176	-2.43	-0.126	-1.68
Certificate level 3 or 4	-0.164	-2.42	-0.175	-2.51
Certificate level 1 or 2	-0.103	-1.63	-0.033	-0.49
Year 12 only	-0.139	-2.16	-0.090	-1.35
Education level unknown	-0.209	-1.95	-0.238	-2.14
Self-employed	0.040	0.44	-0.019	-0.20
Owner manager	0.299	2.31	0.258	1.94
Employee part-time	0.076	1.38	0.109	1.93
Unemployed	-0.510	-2.51	-0.439	-2.08
Unemployed * unemployment rate	0.003	0.23	-0.004	-0.28
Permanently sick	-0.181	-1.83	-0.265	-2.58
Retired	0.162	1.88	0.224	2.51
Full-time student	-0.062	-0.57	-0.074	-0.66
Other non-participant	0.222	3.55	0.252	3.88
Log household income	0.051	1.87	0.096	3.26
Household income missing	0.537	1.82	1.006	3.17
Negative household income	0.509	1.45	0.815	2.12
House renter	-0.210	-4.48	-0.193	-3.76
Rent free	0.031	0.26	-0.076	-0.57

Table 4 (continued)

Explanatory variables	*Basic*		*Fixed Effects*	
	β	*t-stat*	β	*t-stat*
Religion is important (0-10)	0.040	7.37	0.041	7.40
Suspicious of interview questions	0.033	0.36	-0.094	-0.99
Savings time horizon (1-6)	0.074	5.82	0.070	5.40
Savings time horizon missing	0.009	0.12	0.037	0.47
Others present during interview	0.181	4.57	0.141	3.34
Lived with both parents aged 14	0.087	1.68	0.104	1.95
Constant	7.779	23.77	7.350	21.02
Sample (observations)	7309		7309	
Sample (groups)	-		488	
Average observations per group	-		15.0	
R-squared (within)	-		0.132	
R-squared (between)	-		0.224	
R-squared (overall)	0.142		0.139	
Rho (fraction of variance due to group effect)	-		0.089	
Hausman test (random versus fixed effects)	-		75.88 (p=0.002)	

Note: Omitted categories are single with no children, native-born (non-ATSI), fluent English language speaking ability, no long-term health condition, no qualifications, full-time employment, owner/mortgage, not suspicious about interview questions, no others present during interview, and did not live with both parents at age 14.

Table 5: The Determinants of Life Satisfaction for Males in Australia:

OLS estimates (including Census and HILDA Derived Neighbourhood Characteristics)

Explanatory variables	*Census*		*Census PCA*		*HILDA*	
	β	*t-stat*	β	*t-stat*	β	*t-stat*
Neighbourhood characteristics (Census)						
% unemployed	0.005	0.93	-	-	-	-
% lone parents	-0.014	-2.50	-	-	-	-
% NESB immigrants	-0.007	-3.07	-	-	-	-
Mean weekly household income	-0.013	-0.34	-	-	-	-
% of home owners	-0.002	-1.29	-	-	-	-
% with degree or above	0.010	1.49	-	-	-	-
% of professionals	-0.006	-1.55	-	-	-	-
% of males	-0.002	-0.37	-	-	-	-
% over 65 years	0.000	0.08	-	-	-	-
Factor 1: income, degree, professional	-	-	-0.019	-0.69	-	-
Factor 2: unemployed, lone parent, immigrants	-	-	-0.043	-1.91	-	-
Factor 3: over 65, male	-	-	-0.043	-1.97	-	-
Neighbourhood characteristics (HILDA)						
Social interaction	-	-	-	-	0.162	4.73
Amenity	-	-	-	-	0.011	0.57
Civility	-	-	-	-	0.012	0.69
Inner	-0.011	-0.18	0.070	0.69	0.034	0.66
Outer	0.192	2.46	0.299	1.82	0.219	3.13
Remote	0.152	0.89	0.271	1.97	0.098	0.60
State Controls	YES	YES	YES	YES	YES	YES
Constant	8.266	14.47	7.704	20.92	6.418	12.77
Sample (observations)	6594		6594		6594	
R-squared (overall)	0.132		0.131		0.133	

Note: The same other explanatory variables included in Table 3 are also included in each of these models.

Table 6: The Determinants of Life Satisfaction for Females in Australia:

OLS estimates (including Census and HILDA Derived Neighbourhood Characteristics)

Explanatory variables	*Census*		*Census PCA*		*HILDA*	
	β	*t-stat*	*β*	*t-stat*	*β*	*t-stat*
Neighbourhood characteristics (Census)						
% unemployed	0.006	1.38	-	-	-	-
% lone parents	-0.019	-3.75	-	-	-	-
% immigrants	-0.007	-3.06	-	-	-	-
Mean weekly household income	-0.015	-0.41	-	-	-	-
% of home owners	-0.003	-1.68	-	-	-	-
% with degree or above	0.003	0.49	-	-	-	-
% of professionals	0.000	-0.11	-	-	-	-
% of males	0.000	0.07	-	-	-	-
% over 65 years	-0.002	-0.71	-	-	-	-
Factor 1: income, degree, professional	-	-	-0.002	-0.08	-	-
Factor 2: unemployed, lone parent, immigrants	-	-	-0.047	-2.18	-	-
Factor 3: over 65, male	-	-	-0.026	-1.33	-	-
Neighbourhood characteristics (HILDA)						
Social interaction	-	-	-	-	0.084	2.64
Amenity	-	-	-	-	-0.001	0.06
Civility	-	-	-	-	-0.011	0.70
Inner	0.069	1.22	0.160	3.15	0.130	2.68
Outer	0.225	3.05	0.344	5.19	0.179	4.22
Remote	0.227	1.37	0.367	2.32	0.313	1.96
State Controls	YES	YES	YES	YES	YES	YES
Constant	7.867	14.95	7.418	22.17	7.00	15.19
Sample (observations)	7309		7309		7309	
R-squared (overall)	0.152		0.150		0.151	

Note: The same other explanatory variables included in Table 3 are also included in each of these models.

Appendix

Table A1: Sample Means and Standard Deviations

Variable	*Males*		*Females*	
	Mean	*Std. dev.*	*Mean*	*Std. dev.*
Life satisfaction (0-10)	7.903	1.672	8.016	1.661
Control variables				
Age	43.34	17.50	43.83	17.82
Married	0.552	0.497	0.528	0.499
Co-habiting	0.097	0.296	0.096	0.295
Separated	0.026	0.159	0.035	0.183
Divorced	0.045	0.207	0.061	0.240
Widowed	0.019	0.135	0.076	0.266
Lone-parent	0.009	0.095	0.060	0.238
Number of children	0.547	1.024	0.625	1.064
Number of adults in household	2.342	0.984	2.256	0.992
Aboriginal / Torres Strait Islander	0.015	0.121	0.022	0.146
Immigrant (English speaking country)	0.116	0.320	0.103	0.304
Immigrant (non-English speaking country)	0.143	0.350	0.147	0.353
Poor English language speaking ability	0.048	0.214	0.053	0.224
Severe long-term health condition	0.012	0.109	0.008	0.090
Moderate long-term health condition	0.165	0.371	0.155	0.362
Slight long-term health condition	0.078	0.267	0.055	0.228
Degree or higher	0.173	0.378	0.196	0.397
Diploma	0.081	0.273	0.080	0.272
Certificate level 3 or 4	0.258	0.438	0.094	0.292
Certificate level 1 or 2	0.061	0.240	0.111	0.314
Year 12 only	0.107	0.309	0.111	0.314
Education level unknown	0.016	0.127	0.031	0.174
Self-employed	0.107	0.309	0.051	0.221
Owner manager	0.055	0.228	0.022	0.147
Employee part-time	0.087	0.282	0.229	0.420
Unemployed	0.053	0.224	0.035	0.184
Unemployed * unemployment rate	0.651	3.159	0.398	2.392
Permanently sick	0.079	0.270	0.061	0.240
Retired	0.113	0.316	0.113	0.317
Full-time student	0.039	0.194	0.038	0.192
Other non-participant	0.030	0.170	0.209	0.407
Log household income	7.575	4.898	7.256	4.952
Household income missing	0.285	0.451	0.305	0.460
Negative household income	0.005	0.067	0.007	0.082
House renter	0.253	0.435	0.258	0.438
Rent free	0.022	0.148	0.024	0.152

Table A1 (continued)

Variable	*Males*		*Females*	
	Mean	*Std. dev.*	*Mean*	*Std. dev.*
Religion is important (0-10)	4.165	3.571	5.179	3.587
Suspicious of interview questions	0.052	0.221	0.043	0.203
Savings time horizon (1-6)	2.497	1.667	2.552	1.687
Savings time horizon missing	0.087	0.282	0.083	0.276
Others present during interview	0.430	0.495	0.367	0.482
Lived with both parents aged 14	0.854	0.352	0.853	0.355
Neighbourhood characteristics				
Inner regional	0.280	0.449	0.277	0.448
Outer regional	0.121	0.326	0.116	0.320
Remote	0.017	0.128	0.015	0.121
Victoria	0.254	0.436	0.260	0.439
Queensland	0.192	0.394	0.192	0.391
Western Australia	0.102	0.303	0.097	0.295
South Australia	0.094	0.292	0.093	0.290
Tasmania	0.029	0.167	0.030	0.170
ACT	0.017	0.128	0.017	0.129
Northern Territory	0.005	0.067	0.005	0.071
Social interaction (2-10)	6.416	0.715	6.400	0.700
Amenity (4-20)	10.487	1.341	10.522	1.388
Incivility (4-20)	10.179	1.531	10.201	1.540
% unemployed	9.906	5.939	9.834	5.857
% lone parents	9.881	4.828	9.978	4.867
% NESB immigrants	12.514	12.403	12.768	12.507
Mean weekly household income (0-6)	3.212	0.947	3.213	0.936
% of home owners	67.731	16.389	67.609	16.169
% with degree or above	5.511	4.551	5.622	4.642
% of professionals	16.434	8.391	16.703	8.561
% of males	49.212	3.681	48.971	3.675
% over 65 years	12.261	8.370	12.593	9.039

Table A2: The Determinants of Life Satisfaction in Australia: Ordered Probit Estimates

Explanatory variables	*Males*		*Females*	
	β	*t-stat*	β	*t-stat*
Age	-0.040	-7.66	-0.027	-5.86
Age-squared /100	0.047	8.61	0.035	7.25
Married	0.305	6.30	0.202	4.23
Co-habiting	0.230	4.27	0.126	2.38
Separated	-0.161	-1.79	-0.304	-3.88
Divorced	-0.083	-1.14	-0.083	-1.27
Widowed	-0.030	-0.26	0.080	1.12
Lone-parent	-0.103	-0.74	-0.246	-3.95
Number of children	-0.053	-3.50	-0.027	-1.85
Number of adults in household	0.009	0.58	0.015	0.95
Aboriginal / Torres Strait Islander	0.337	3.10	0.201	2.34
Immigrant (English speaking country)	0.039	0.95	0.071	1.72
Immigrant (non-English speaking country)	-0.123	-2.75	-0.164	-3.84
Poor English language speaking ability	-0.284	-3.98	-0.400	-6.00
Severe long-term health condition	-0.608	-4.86	-0.754	-5.40
Moderate long-term health condition	-0.424	-10.45	-0.484	-12.77
Slight long-term health condition	-0.170	-3.48	-0.098	-1.79
Degree or higher	-0.246	-5.80	-0.225	-5.99
Diploma	-0.205	-3.92	-0.159	-3.24
Certificate level 3 or 4	-0.050	-1.39	-0.127	-2.76
Certificate level 1 or 2	-0.119	-2.05	-0.096	-2.24
Year 12 only	-0.158	-3.35	-0.134	-3.09
Education level unknown	0.040	0.39	-0.177	-2.45
Self-employed	-0.026	-0.57	0.029	0.48
Owner manager	0.073	1.24	0.252	2.86
Employee part-time	0.017	0.33	0.062	1.69
Unemployed	-0.449	-3.80	-0.274	-2.01
Unemployed * unemployment rate	0.026	3.13	0.004	0.38
Permanently sick	-0.054	-0.82	-0.049	-0.74
Retired	0.152	2.37	0.164	2.79
Full-time student	0.156	2.04	-0.005	-0.06
Other non-participant	0.183	2.26	0.208	4.90
Log household income	0.036	1.83	0.027	1.45
Household income missing	0.372	1.74	0.286	1.43
Negative household income	0.335	1.21	0.258	1.08
House renter	-0.175	-5.28	-0.135	-4.28
Rent free	-0.122	-1.39	0.039	0.47

Table A2 (continued)

Explanatory variables	*Males*		*Females*	
	β	*t-stat*	β	*t-stat*
Religion is important (0-10)	0.034	8.85	0.029	7.95
Suspicious of interview questions	-0.136	-2.32	0.021	0.35
Savings time horizon (1-6)	0.025	2.68	0.049	5.76
Savings time horizon missing	-0.075	-1.42	0.015	0.28
Others present during interview	0.096	3.45	0.140	5.20
Lived with both parents aged 14	0.106	2.88	0.056	1.59
Sample (observations)	6594		7309	
Log likelihood (0)	-11801		-12939	
Log likelihood	-11351		-12387	
Pseudo R-squared	0.131		0.144	

Notes: Omitted categories are single with no children, native-born (non-ATSI), fluent English language speaking ability, no long-term health condition, no qualifications, full-time employment, owner/mortgage, not suspicious about interview questions, no others present during interview, and did not live with both parents at age 14. Ten constant thresholds were also estimated.

The pseudo R-squared measure is based on the size of the estimated (or unrestricted) log-likelihood function (L_u) relative to the (restricted) log-likelihood (L_r) when all parameters except a constant term are set to zero. The particular formula used here is:

$$[1-e^{2(L_r-L_u)/n}] / [1-e^{2L_r/n}]$$