Department for Communities and Local Government

English Housing Survey

Housing and Well-being Report, 2014

ENGLISH HOUSING SURVEY

Contents

Introduction and main findings

1. The English Housing Survey is a national survey of people's housing circumstances and the condition and energy efficiency of housing in England. It was first run in 2008-09. Prior to then, the survey was run as two standalone surveys: the English House Condition Survey and the Survey of English Housing.

2. This report is based on findings from the 2014 survey, based on fieldwork carried out between April 2013 and March 2015. The sample includes cases where both a physical inspection of the property and an interview with the household was undertaken, allowing analyses of both the individual and housing factors associated with well-being.

3. The report begins with a summary of the two well-being indicators covered by this report: life satisfaction and anxiety. Chapter 2 reports the findings from regression analysis which seeks to identify the individual and property-related predictors of well-being. The report ends with some conclusions and options for further work.

Main findings

Most people reported medium or high levels of life satisfaction and very low or low levels of anxiety.

- In 2014, the most common response to the question asking about life satisfaction was eight. The mean score was 7.5 and 66% of people gave a score between five and eight.

- The most common rating of anxiety was zero. This means that respondents felt they did not experience any anxiety at all. The mean score was 2.9 and 63% of people gave a score between zero and three.

Life satisfaction and anxiety are primarily driven by personal characteristics but housing circumstances do have some significant effects.

- The regression analysis in this report explained around 20% of the variation in life satisfaction between individuals. Of this, personal characteristics accounted for 18% whilst housing factors accounted for 3%[1].

- The top predictors of life satisfaction were self-reported health, marital status and employment status.

[1] These figures are rounded for presentation, but unrounded figures sum to 20%

- For anxiety the regression analysis explained around 9% of the variation between individuals. Of this, personal characteristics accounted for 8% whilst housing factors accounted for 1%.

- The top predictors of anxiety were self-reported health, employment status and whether they had a limiting long-term illness.

- There were some personal factors that appeared to drive anxiety but not life satisfaction. These were gender, having dependent children and region.

The top housing factor associated with both life satisfaction and anxiety was being in arrears with rent or mortgage payments.

- Being in arrears reduced an individual's life satisfaction by 0.6 points. This was the fifth highest predictor of life satisfaction just after income, which showed a difference of 0.6 points between the lowest and highest income quintiles.

- Being in arrears increased anxiety by 0.6 points. This was the fifth highest predictor of anxiety just after region, which showed a difference of 0.5 points between the regions with the lowest (North West) and highest (London) anxiety. Unlike life satisfaction however, anxiety did not seem to be influenced by other housing factors.

For life satisfaction, the second most important property-related predictor was the type of tenure, with social renters having higher levels of satisfaction.

- After controlling for personal and other housing factors, life satisfaction was higher for both local authority and housing association renters compared to outright owners.

- Social renters had higher life satisfaction by 0.2 points. No significant differences were identified between outright owners and mortgagors or private renters.

The next most important property-related predictor of life satisfaction was the type of dwelling.

- Compared to living in terraced houses, living in semi-detached houses or (converted or purpose built) flats decreased life satisfaction.

- The largest difference observed was between people living in terraced houses and high rise purpose built flats; their level of life satisfaction was, on average, 0.3 points lower.

The final significant property-related predictor of life satisfaction was repair costs

- As the average cost of repairs per square metre increased from £0 to £41, the level of satisfaction decreased by 0.03 points.

Overcrowding and other housing factors did not appear to have a significant effect on life satisfaction

- The results indicate that overcrowding did not have a significant effect but this could be explained by the objective nature of its measurement. People may be classed as overcrowded according to the bedroom standard, however, not perceive a shortage of space in their accommodation.

- Once other factors were controlled for, meeting the decent homes standard, and the presence of damp and thermal comfort were not significantly associated with life satisfaction.

Acknowledgements and further queries

4. Each year the English Housing Survey relies on the contributions of a large number of people and organisations. The Department for Communities and Local Government (DCLG) would particularly like to thank all the households who gave up their time to take part in the survey, NatCen Social Research, the Building Research Establishment (BRE) and CADS Housing Surveys, without whom the 2014-15 survey and this report, would not have been possible.

5. The report was produced in collaboration by DCLG, ZK Analytics and NatCen.

6. If you have any queries about the report, would like any further information or have suggestions for analyses you would like to see included in future EHS reports, please contact ehs@communities.gsi.gov.uk.

7. The responsible analyst for this report is: Reannan Rottier, Housing and Planning Analysis Division, DCLG. Contact via ehs@communities.gsi.gov.uk.

Chapter 1
Well-being

1.1 As part of the Measuring National Well-being Programme[2], DCLG introduced four measures of personal well-being to the English Housing Survey in 2013-14.

- *Overall, how satisfied are you with your life nowadays?* Referred to throughout this report as 'life satisfaction'
- *Overall, how anxious did you feel yesterday?* Referred to throughout this report as 'anxiety'
- *Overall, to what extent do you feel the things you do in your life are worthwhile?*
- *Overall, how happy did you feel yesterday?*

For all questions, respondents are asked to give their answers on a scale of 0 to 10 where 0 is 'not at all' and 10 is 'completely'.

1.2 This chapter gives a summary of the two well-being indicators covered in this report: life satisfaction and anxiety. The results are very similar to those from the 2014-15 Annual Population Survey, published by the ONS[3].

Life satisfaction

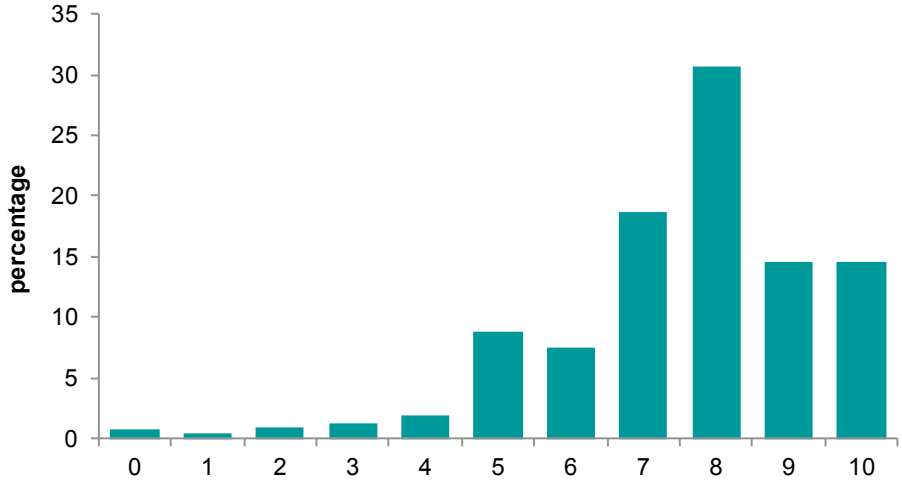
1.3 In 2014, the most common response to the question asking about life satisfaction (modal value) was eight, with very few respondents scoring four or below, Figure 1.1. The average life satisfaction score was 7.5, Annex Table 1.1.

1.4 Generally, scores of nine and ten can be taken as very high life satisfaction; 29% of respondents were shown to be in this category. Conversely, low life satisfaction is indicated by scores between zero and four. Using this measure, in 2014, 5% of respondents had low life satisfaction, Annex Table 1.2.

[2] In Government, the Office for National Statistics (ONS) leads on the Measuring National Well-being Programme. The programme aims to produce accepted and trusted measures on well-being in the UK. See here for further information: http://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing

[3] ONS, Personal Well-being Measures, July 2016 release: https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/datasets/personalwellbeingestimatesgeographicalbreakdown

Figure 1.1: Distribution of life satisfaction scores, 2014



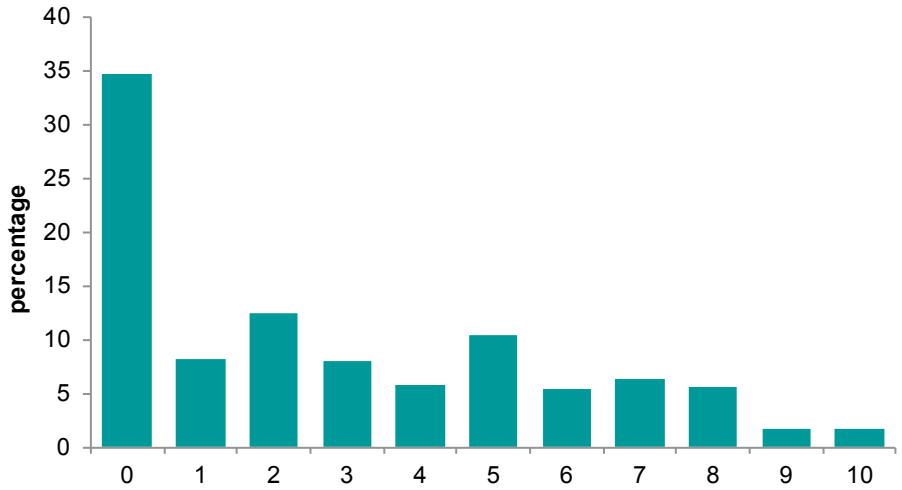
Base: all households where the HRP was the respondent
Note: underlying data are presented in Annex Table 1.1
Source: English Housing Survey, household sub-sample

Anxiety

1.5 In 2014, the most common rating (the modal value) of anxiety was 0. This means that most respondents felt they did not experience any anxiety at all, Figure 1.2. The average anxiety score was 2.9, Annex Table 1.1.

1.6 Scores between six and ten generally indicate high levels of anxiety; 21% of respondents fall into one of these categories. Very low anxiety is represented by a score of zero or one; 43% of respondents fell into one of these categories, Annex Table 1.2.

Figure 1.2: Distribution of anxiety scores, 2014



Base: all households where the HRP was the respondent
Note: underlying data are presented in Annex Table 1.1
Source: English Housing Survey, household sub-sample

Chapter 2
Factors associated with well-being

2.1 This chapter identifies the personal and housing factors that best explain a respondents' level of well-being. The analysis uses two different measures of well-being: life satisfaction and anxiety.

2.2 Linear regression analysis was used to isolate the impact of housing and personal characteristics on these measures of well-being. The analysis was undertaken in two stages. First, the personal and housing factors that had significant effects on life satisfaction were ranked in order of importance. Second, each factor was analysed to determine which of its categories were more likely to be associated with life satisfaction.

2.3 In developing the regression models, reference was made to models developed by the ONS on common non-housing related predictors of well-being. These should be controlled for in order to isolate the effect of housing factors[4].

2.4 Housing factors were chosen for analysis based on previous research such as the Eurofound report on subjective well-being in Europe[5].

2.5 More detail on the methodology used in this report is provided in the technical notes.

Life satisfaction

2.6 Analysis was undertaken in order to assess the impact of housing factors on life satisfaction after controlling for the impact of personal characteristics, Figure 2.1.

The impact of housing factors

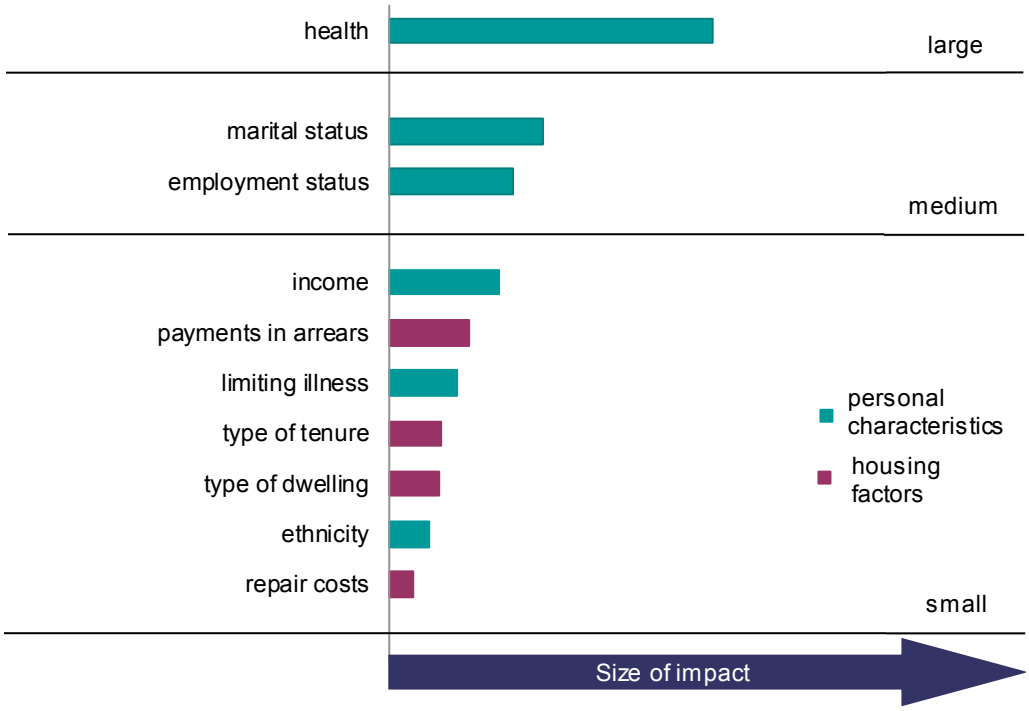
2.7 Amongst the housing factors included in the regression analysis, having mortgage or rent **payments in arrears** was the most important predictor of life satisfaction. Being in arrears had a negative impact, decreasing life satisfaction by 0.6 points on the scale ranging from 0 to 10, Annex Table 2.3.

[4] http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/rel/wellbeing/measuring-national-well-being/what-matters-most-to-personal-well-being-in-the-uk-/art-what-matters-most-to-personal-well-being-in-the-uk-.html

[5] http://www.eurofound.europa.eu/publications/report/2013/quality-of-life-social-policies/quality-of-life-in-europe-subjective-well-being

2.8 The second most important housing factor related to life satisfaction was the **type of tenure**.

Figure 2.1: The predictors of life satisfaction, 2014



Base: all households where the HRP was the respondent
Notes:
1) age also has a significant effect but is not comparable and not included in the graph[6]
2) underlying data are presented in Annex Table 2.1
Source: English Housing Survey, household sub-sample

2.9 The EHS Headline Report 2014-15 showed that, on average, outright owners had the highest level of satisfaction followed by those buying with a mortgage ('mortgagors'), private renters and social renters[7].

2.10 However, this analysis shows that once the effects of personal and other housing characteristics are taken into account and held constant, the level of life satisfaction was higher for both local authority and housing association renters compared to that of outright owners (by 0.2 points). No significant differences were identified between outright owners and mortgagors or private renters, Figure 2.2.

[6] ONS analysis in 'What matters most to Personal Well-being?' which is based on 2011-12 data found that age had a 'moderate' effect on life satisfaction, smaller than marital status but larger than ethnicity or tenure. http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/rel/wellbeing/measuring-national-well-being/what-matters-most-to-personal-well-being-in-the-uk-/art-what-matters-most-to-personal-well-being-in-the-uk-.html

[7] See Figure 1.14 and Annex Table 1.21 https://www.gov.uk/government/statistics/english-housing-survey-2014-to-2015-headline-report

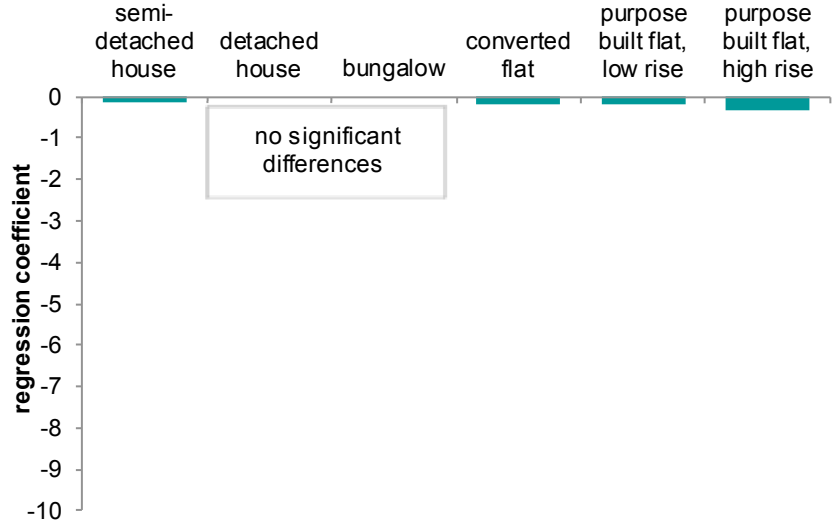
Figure 2.2: The effect of tenure on life satisfaction compared to those who own outright, 2014

Base: all households where the HRP was the respondent
Notes:
1) presented on the same scale as life satisfaction to give context
2) underlying data are presented in Annex Table 2.3
Source: English Housing Survey, household sub-sample

2.11 The next most important housing related predictor of life satisfaction was the **type of dwelling**. Compared to living in terraced houses, living in flats (converted or purpose built) or semi-detached houses decreased life satisfaction. The largest difference was observed between people living in terraced houses and high rise purpose built flats whose level of life satisfaction was, on average 0.3 points lower[8], Figure 2.3.

[8] As with tenure, the simple averages indicate a slightly different pattern, with those who live in detached and semi-detached houses having slightly higher levels of life satisfaction compared to those living in terraced properties. However, the results are consistent in showing that people who live in flats have lower levels of life satisfaction than those living in terraced houses.

Figure 2.3: The effect of dwelling type on life satisfaction compared to those living in terraced houses, 2014



Base: all households where the HRP was the respondent
Notes:
1) presented on the same scale as life satisfaction to give context
2) underlying data are presented in Annex Table 2.3
Source: English Housing Survey, household sub-sample

2.12 The final significant housing factor related to life satisfaction was the **cost of repairs** required to the property (as assessed by a qualified surveyor when the property is inspected). As the average cost of repairs per metre increased from £0 to £41, the level of satisfaction decreased by 0.03 points.

2.13 The results indicate that overcrowding measured objectively (using the bedroom standard, see Glossary) did not have a significant effect at the accepted 0.05 level of statistical significance[9]. However, it is apparent that the difference between people living in properties that are at standard compared to those that are under-occupied is close to attaining statistical significance (0.06). The results tentatively indicate that those who live in under-occupied properties were more likely to be more satisfied with their life.

2.14 Meeting the decent homes standard, the presence of damp, and thermal comfort were not significantly associated with life satisfaction.

The impact of personal characteristics

2.15 Overall, the state of the respondent's **health** had the largest impact on life satisfaction. Compared to those who considered their health to be very good, progressively more negative assessments of state of health decreased life satisfaction. Those who considered their health to be very bad had a level of life satisfaction 2.7 points lower than those who considered their health to be very good.

[9] There is evidence that suggests that overcrowding measured using objective measures, such as the bedroom standard, is likely not to show a significant effect on life satisfaction. However, subjective overcrowding (i.e. by asking the respondents whether they think their accommodation is overcrowded) is likely to affect life satisfaction. http://www.insee.fr/en/publications-et-services/dossiers_web/stiglitz/VE4-Anglais.pdf

2.16 The second largest predictor of low life satisfaction was **marital status**. After controlling for all other factors, compared to married people all other categories had lower levels of life satisfaction. The largest effects were identified for those who were separated and widowers, whose levels of life satisfaction were lower, by 0.8 and 0.6 points respectively (on a scale from 0 to 10).

2.17 **Employment status** was also shown to impact life satisfaction. Compared to full-time employment, unemployment was shown to decrease life satisfaction by 0.5 points. Conversely, retirement and being in full-time education increased life satisfaction by 0.3 and 0.6 points respectively.

2.18 The joint **income** of the HRP and their partner (after housing costs) was shown to have a significant effect, with life satisfaction increasing with income. The difference between the bottom and top income quintiles is 0.6 points (on a scale from 0 to 10).

2.19 Even after controlling for levels of health, having **a limiting long-term illness** had a small significant impact on life satisfaction, decreasing it by approximately 0.2 points.

2.20 **Ethnicity** was shown to have a significant impact. On average, black people had slightly lower levels of life satisfaction compared to white people by under 0.4 points.

2.21 Finally, **age** had a significant effect on life satisfaction. However, its effect is not linear and as such is not strictly comparable in size with the effects of the other variables. For this reason it is not displayed in Figure 2.1.

2.22 Life satisfaction decreased with age until around the age of 50. However, for people over 50, levels of life satisfaction increased with age.

Relative impact of personal and housing factors

2.23 The regression analysis explained 20% of the variation in life satisfaction between individuals. Of this, personal characteristics accounted for 18% whilst housing factors accounted for 3%[10], Annex Table 2.5.

2.24 The remaining unexplained variation is due to factors not tested in the analysis. Around half of the variation in well-being is thought to be explained by genetic and personality factors, which are very difficult to measure and are not included on the English Housing Survey.

[10] These figures are rounded for presentation, but unrounded figures sum to 20%

Anxiety

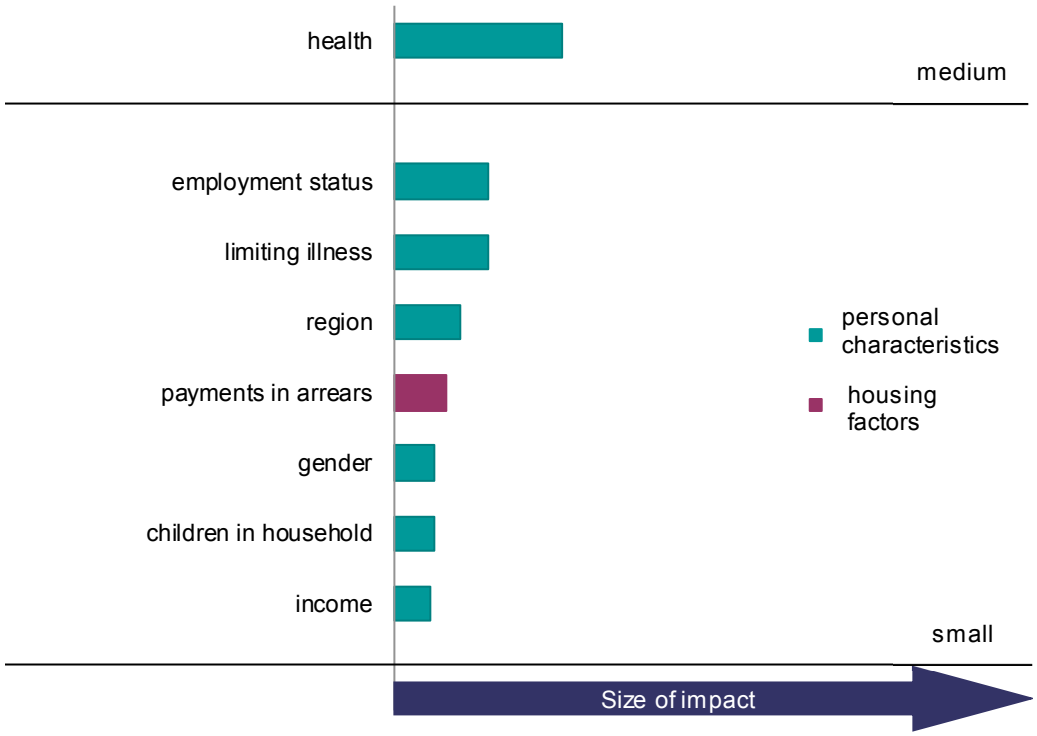
2.25 Regression analysis was also carried out to identify the factors associated with anxiety and to assess the impact of housing factors on anxiety after controlling for the impact of personal characteristics, Figure 2.4.

The impact of housing factors

2.26 The only housing factor that was shown to have an effect on anxiety was **arrears**. Being in arrears with mortgage or rent payments increased anxiety by approximately 0.6 points, Annex Table 2.4.

2.27 Other housing related variables included in the regression analysis did not have statistically significant effects. These include the type of tenure, type of dwelling, overcrowding, decent homes standard, repair costs, thermal comfort and the presence of damp.

Figure 2.4: The predictors of anxiety, 2014



Base: all households where the HRP was the respondent
Notes:
1) age also has a significant effect but is not comparable and not included in the graph[11]
2) underlying data are presented in Annex Table 2.2
Source: English Housing Survey, household sub-sample

[11] ONS analysis in 'What matters most to Personal Well-being?' which is based on 2011-12 data found that age had a 'small' effect on anxiety , smaller than economic activity but larger than marital status, ethnicity and tenure (and several other 'very small' factors).
http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/rel/wellbeing/measuring-national-well-being/what-matters-most-to-personal-well-being-in-the-uk-/art-what-matters-most-to-personal-well-being-in-the-uk-.html

The impact of personal characteristics

2.28 Amongst the factors included in the regression, **health** was shown to be the most important driver of anxiety. A person considering themselves to be in very bad health had higher anxiety by 2.1 points compared to someone considering themselves to be in very good health.

2.29 In addition to general levels of health, having **a limiting long-term illness** further increased the level of anxiety (by approximately 0.5 points).

2.30 **Employment status** had a significant impact on anxiety. Compared to full-time employment, unemployment was shown to increase anxiety (by 0.5 points). Conversely, retirement and being in full-time education, decreased anxiety by 0.4 and 0.5 points respectively.

2.31 **Region** was a significant predictor of anxiety. Specifically, the results showed that living in London increased the likelihood of experiencing higher levels of anxiety, compared with almost all other regions. The differences between London and other regions varied from 0.3 to 0.5 points.

2.32 **Gender** was also associated with anxiety; after controlling for all other variables, men reported slightly lower levels of anxiety (0.2 points).

2.33 Households that included **dependent children** were shown to have lower levels of anxiety. This decreased anxiety by approximately 0.2 points.

2.34 The joint **income** of the HRP and their partner (after housing costs) was shown to have a significant effect on anxiety. It indicated that as income increased anxiety decreased. The difference between the bottom and top income quintiles was 0.3 points.

2.35 Finally, **age** also had a significant impact on anxiety. For the reasons explained above, the effect of age was not included in Figure 2.2. For people under 35, increasing age was shown to have a negative impact, increasing anxiety. However, for people over 35, as age increased, anxiety decreased.

Relative impact of personal and housing factors

2.36 The regression analysis explained 9% of the variation in anxiety between individuals. Of this, personal characteristics accounted for 8% whilst housing factors accounted for 1%, Annex Table 2.5.

2.37 The remaining unexplained variation is due to factors not tested in the analysis. Around half of the variation in well-being is thought to be explained by genetic and personality factors, which are very difficult to measure and are not included on the English Housing Survey.

Chapter 3
Summary and conclusions

3.1 This chapter summarises the findings and presents our conclusions. Generally, the results indicated well-being to be mainly driven by personal characteristics. These findings are consistent with ONS'[12] which also show that personal characteristics, and particularly health, are the primary drivers of well-being.

3.2 Housing factors had some small effects and were more prominent in explaining life satisfaction than anxiety. The top housing factor that was a driver of both life satisfaction and anxiety was being in arrears[13] with rent or mortgage payments. However, unlike life satisfaction, anxiety did not seem to be influenced by other housing factors, such as tenure or dwelling type.

3.3 The primary personal characteristic driving both life satisfaction and anxiety was self-reported health. Being in poor health had a strong negative effect, decreasing life satisfaction and increasing anxiety.

3.4 Other common personal characteristics which affected life satisfaction were age, employment status, income, and limiting illness.

3.5 On the effects of age it was found that up until a certain age, the older the individual, the lower the well-being. Once beyond these ages the older the individual, the higher the well-being. For life satisfaction the turning point was around 50 years old and for anxiety it was 35.

3.6 The two analyses diverge when it comes to personal characteristics that drive life satisfaction versus anxiety. The results indicated that anxiety was more heavily impacted by personal characteristics (versus housing factors). Specifically, gender, the presence of dependent children and region were shown to impact anxiety without impacting life satisfaction. Conversely life satisfaction was affected by ethnicity and marital status whilst anxiety was not.

Conclusions

3.7 Taken as a whole, the set of analyses carried out indicated that well-being is primarily driven by personal characteristics while housing factors, overall, have a limited impact. Nonetheless, being in arrears with rent or mortgage

[12] http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/rel/wellbeing/measuring-national-well-being/what-matters-most-to-personal-well-being-in-the-uk-/art-what-matters-most-to-personal-well-being-in-the-uk-.html

[13] Overall 3% of respondents included in the analysis were found to be in arrears with mortgage or rent payments.

payments is shown to have significant negative effects of both anxiety and life satisfaction, surpassing the effect of some personal characteristics.

3.8 The fact that housing conditions do not have a large impact on well-being could be due to objective rather than subjective nature of the EHS metrics. Research has shown that individuals may or may not perceive housing conditions such as overcrowding to be a problem, and indeed may not perceive their home as overcrowded despite it being assessed as such by the bedroom standard. Further work could be carried out into the link between objective and subjective measures of housing conditions and whether the subjective measures do impact well-being. The EHS does not generally contain subjective questions on housing conditions but we are considering adding questions to assess subjective overcrowding to a future survey.

3.9 Other future analysis of well-being could include:

- Analysis of other factors relating to housing and the built environment such as age of dwelling, presence of outdoor space, dwelling density etc.
- Analysis of housing and well-being for particular groups such as tenure groups or older households.
- Analysis of the drivers of satisfaction with accommodation (and what is the relationship between satisfaction with accommodation and well-being).

Technical notes and glossary

Technical notes

1. Results for this report are presented for '2014' and are based on fieldwork carried out between April 2013 and March 2015 (a mid-point of April 2014) on a sample of 11,851 households where both a physical inspection of the property and an interview with the household was undertaken. Throughout the report, this is referred to as the 'household sub-sample'.

2. Where the numbers of cases in the sample are too small for any inference to be drawn about the national picture, the cell contents are replaced with a 'u'. This happens where the cell count is less than 5. When percentages are based on a row or column total with unweighted total sample size of less than 30, the figures are italicised. Figures in italics are therefore based on a small sample size and should be treated as indicative only.

3. Where comparative statements have been made in the text, these have been significance tested to a 95% confidence level. This means we are 95% confident that the statements we are making are true.

4. Additional annex tables, including the data underlying the figures and charts, are published on the website: https://www.gov.uk/government/collections/english-housing-survey, alongside many supplementary tables that are too numerous to include in our reports. Further information on the technical details of the survey, and information and past reports on the Survey of English Housing and the English House Condition Survey, can also be accessed via this link.

Linear regressions

5. Regression analyses were implemented to assess which personal characteristics and housing factors were statistically related to various measures of well-being.

6. Two different measures of well-being were used: life satisfaction and anxiety. For each of the two measures, one regression was implemented and its results were presented in this report.

7. We implemented OLS (ordinary least squares or linear) regressions which are appropriate for continuous data. We performed the usual regression diagnostics, including checks for multicollinearity, normality of residuals and heteroskedasticity. The model implemented for life satisfaction passed all these checks.

8. However, the regression implemented to identify the predictors of anxiety appeared to break the normality assumption, primarily due to the dependent variable (anxiety) being severely positively skewed (35% of responses were in the 0 category). This also meant that we were unable to rectify the lack of normality by using the log of the anxiety variable. As such, we implemented a negative binomial general linear model to estimate the effects of predictors on anxiety. We also checked the results using ordered logistic regression. The results were broadly consistent with the OLS regression.

9. To facilitate the presentation of the results and ease of interpretation we presented the results of the OLS model for anxiety, noting that in the results presented, the level of significance of some variables might be slightly overestimated. These variables are: employment; income, children and arrears.

Logistic regressions

10. In addition to the OLS regressions discussed in this report, we also carried out logistic regressions on low and high well-being. Logistic regression is appropriate when analysing a binary variable which takes one of two possible values. Regressions on low and high well-being were carried out for both life satisfaction and anxiety

11. The ONS bands for low/high well-being were used. For life satisfaction values zero through four were deemed to describe low life satisfaction, while values nine and ten signified very high life satisfaction. For anxiety, values six through ten indicated high anxiety and values zero and one pointed to very low anxiety.

12. The results of the logistic regressions provide alternative ways of understanding the relationships between well-being and its drivers. They specifically focus on ascertaining the drivers of the two extreme groups: those with low and those with very high well-being. To simplify conclusions they have not been discussed in the report but results can be found in Annex Tables 2.6 through 2.9.

Variables

13. Personal factors were chosen according to models developed by the Office of National Statistics14. Housing factors were chosen for analysis based on previous research such as the Quality of life in Europe Subjective well-being15. Some factors were excluded due to being too closely related to one another, for example it was only possible to use one measure of repair costs so the variable with the strongest relationship to well-being, comprehensive repairs, was used.

[14] http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/rel/wellbeing/measuring-national-well-being/what-matters-most-to-personal-well-being-in-the-uk-/art-what-matters-most-to-personal-well-being-in-the-uk-.html

[15] http://www.eurofound.europa.eu/publications/report/2013/quality-of-life-social-policies/quality-of-life-in-europe-subjective-well-being

14. Most variables in the model were entered as categorical variables. When using categorical variables in regression analysis they were introduced as dummy variables and one of the categories was specified as the 'reference category'. The model assigned a zero value to this group and all others are estimated in comparison to it. In general, the reference category was set to be the group with the highest sample size, or, in particular cases, the group that was most relevant from a substantive point of view.

15. The following categorical variables were entered in all models:

- type of tenure
- type of dwelling
- decent homes standard
- presence of damp
- thermal comfort
- children in the household
- overcrowding (bedroom standard)
- marital status of HRP
- gender of HRP
- ethnicity of HRP
- employment status of HRP
- the joint income of the HRP and their partner (after housing costs)
- long-term limiting illness
- health
- being in arrears with payments
- region

16. In addition a further, categorical, control variable was included to measure the year in which the data was collected. This was necessary as the analysis was carried out on the paired 2014 dataset containing only those households that were physically surveyed.

17. The variable measuring comprehensive repair costs (per square metre) was treated as a scalar variable in the regression models. A negative coefficient indicates that as the cost increases the outcome variable also decrease. A positive coefficient indicates that as costs decrease, the outcome variable increases.

18. Given that previous research indicates that age has curvilinear effect on well-being, we followed standard practice and included both age and its square.

Implementation

19. The regression analysis was carried out on standardised weighted data. Standardisation involved scaling the paired household population weight

(aagph1314) so that the sum of scaled weights (associated with cases in the regression model) equalled the sample size. This ensured that any relationships found would not be biased to the over-sampled groups or the very large weighted data sample size.

20. The 'significance' of a regression parameter is an indication of how reliably it has been estimated. Where parameters have significance equal to, or less than 0.05 they were treated as reliable and highlighted in the relevant tables. Where the regression analysis yields a parameter with significance greater than 0.05 that parameter value was treated as unreliable.

21. In addition to the results of the OLS regressions that generated the coefficients comparing each group to its reference category (for the categorical variables), we also computed the overall effect for the categorical factor (irrespective of the reference category that was used) that were shown by the OLS regressions to have differences.

22. To compare between the effects of these categorical variables their overall effects were computed using *standardised sheaf coefficients*.

23. The computation of sheaf coefficients was detailed by Heise[16] and was implemented in Stata[17]. This method implements a post-estimation calculation which is executed after the regression. In essence it reorganises the information in the regression output and generates the overall effect of each underlying variable which is defined in the model by a set of dummy variables. As such, we generated one estimate for each set of dummy variables. The results were graphed. Please see Figures 2.1 and 2.4.

24. The graphs illustrate the standardised coefficients associated with each significant factor. To ensure comparability, we compared the absolute effect of a variable, without emphasising the sign of the effect. All graphs use the same size of scale. The scale itself is removed from the graphs to make interpretation easier. The aim of the graphs is to illustrate visually the relative importance of factors.

25. In addition, factors were grouped by the size of their impact. Factors that had a standardised coefficient smaller than 0.1 were classed as having a 'small effect'. Factors that had a standardised coefficient that was at least 0.1 but lower than 0.2 were classified as having a 'medium effect'. Finally, those factors that achieved a standardised coefficient of at least 0.2 were designated as having a 'large' effect.

26. Finally, to facilitate the quantification of the effects of age, we computed the contributions to the R-squared of age, of other personal characteristics and of

[16] Heise, David (1972) 'Employing Nominal Variables, Induced Variables, and Block Variables in Path Analyses' *Sociological Methods Research* 1 (2): 147-173 http://smr.sagepub.com/content/1/2/147
[17] See here: http://maartenbuis.nl/software/sheafcoef.html for more information

housing factors. Their shares of the explained variance were computed by using the Shapely method for R-squared decomposition, Annex Table 2.5[18].

27. Finally, it is important to consider that although regression analysis can be used to explore associations between variables, it does not necessarily imply causation nor does it contain all relevant variables that have impacts on the dependent variable. This is why the results should be treated as indicative rather than conclusive.

Glossary

Arrears: If the HRP or partner are not up to date with rent or mortgage payments they are considered to be in arrears.

Bedroom standard: The 'bedroom standard' is used by government as an indicator of occupation density. A standard number of bedrooms is calculated for each household in accordance with its age/sex/marital status composition and the relationship of the members to one another. A separate bedroom is allowed for each married or cohabiting couple, any other person aged 21 or over, each pair of adolescents aged 10-20 of the same sex, and each pair of children under 10. Any unpaired person aged 10-20 is notionally paired, if possible, with a child under 10 of the same sex, or, if that is not possible, he or she is counted as requiring a separate bedroom, as is any unpaired child under 10.

This notional standard number of bedrooms is then compared with the actual number of bedrooms (including bed-sitters) available for the sole use of the household, and differences are tabulated. Bedrooms converted to other uses are not counted as available unless they have been denoted as bedrooms by the respondents; bedrooms not actually in use are counted unless uninhabitable.

Households are said to be overcrowded if they have fewer bedrooms available than the notional number needed. Households are said to be under-occupying if they have two or more bedrooms more than the notional needed.

Comprehensive repair costs: Comprehensive repairs include urgent work required in the short term to tackle problems presenting a risk to health, safety, security or further significant deterioration plus any additional work, including replacement of elements that will become necessary within the next ten years. See Chapter 5, Annex 5 of the Technical Report for more information about how these are calculated and assumptions made.

Damp and mould: There are three main categories of damp and mould covered in this report:

[18] Huettner, F., Sunder, M. (2012) 'Axiomatic arguments for decomposing goodness of fit according to Shapley and Owen values'. *Electronic Journal of Statistics*, 6, 1239-1250.

- **rising damp**: where the surveyor has noted the presence of rising damp in at least one of the rooms surveyed during the physical survey. Rising damp occurs when water from the ground rises up into the walls or floors because damp proof courses in walls or damp proof membranes in floors are either not present or faulty.

- **penetrating damp**: where the surveyor has noted the presence of penetrating damp in at least one of the rooms surveyed during the physical survey. Penetrating damp is caused by leaks from faulty components of the external fabric e.g. roof covering, gutters etc. or leaks from internal plumbing, e.g. water pipes, radiators etc.

- **condensation or mould**: caused by water vapour generated by activities like cooking and bathing condensing on cold surfaces like windows and walls. Virtually all dwellings have some level of condensation. Only serious levels of condensation or mould are considered as a problem in this report, namely where there are extensive patches of mould growth on walls and ceilings and/or mildew on soft furnishings.

Dwelling type: Dwellings are classified, on the basis of the surveyor's inspection, into the following categories:

- **small terraced house:** a house with a total floor area of less than 70m^2 forming part of a block where at least one house is attached to two or more other houses. The total floor area is measured using the original EHS definition of useable floor area, used in EHS reports up to and including the 2012 reports. That definition tends to yield a smaller floor area compared with the definition that is aligned with the Nationally Described Space Standard and used on the EHS since 2013. As a result of the difference between the two definitions, some small terraced houses are reported in the 2014 Housing Supply Report as having more than 70m².

- **medium/large terraced house:** a house with a total floor area of 70m^2 or more forming part of a block where at least one house is attached to two or more other houses. The total floor area is measured using the original EHS definition of useable floor area which tends to yield a small floor area compared with the definition used on the EHS since 2013.

- **end terraced house:** a house attached to one other house only in a block where at least one house is attached to two or more other houses.

- **mid terraced house:** a house attached to two other houses in a block.

- **semi-detached house:** a house that is attached to just one other in a block of two.

- **detached house:** a house where none of the habitable structure is joined to another building (other than garages, outhouses etc.).

- **bungalow:** a house with all of the habitable accommodation on one floor. This excludes chalet bungalows and bungalows with habitable loft conversions, which are treated as houses.
- **converted flat:** a flat resulting from the conversion of a house or former non-residential building. Includes buildings converted into a flat plus commercial premises (such as corner shops).
- **purpose built flat, low rise:** a flat in a purpose built block less than six storeys high. Includes cases where there is only one flat with independent access in a building which is also used for non-domestic purposes.
- **purpose built flat, high rise:** a flat in a purpose built block of at least six storeys high.

Economic status: Respondents self-report their situation and can give more than one answer.

- **working full-time/part-time**: full-time work is defined as 30 or more hours per week. Part-time work is fewer than 30 hours per week. Where more than one answer is given, 'working' takes priority over other categories (with the exception that all those over State Pension Age (SPA) who regard themselves as retired are classified as such, regardless of what other answers they give).
- **unemployed**: this category covers people who were registered unemployed or not registered unemployed but seeking work.
- **retired**: this category includes all those over the state pension age who reported being retired as well as some other activity. For men the SPA is 65 and for women it is 60 if they were born before 6th April 1950. For women born on or after the 6th April 1950, the state pension age has increased incrementally since April 2010[19].
- **full-time education:** education undertaken in pursuit of a course, where an average of more than 12 hours per week is spent during term time.
- **other inactive**: all others; they include people who were permanently sick or disabled, those looking after the family or home and any other activity.

On occasions, **full-time education** and **other inactive** are combined and described as **other economically inactive**.

Ethnicity: Classification according to respondents' own perceived ethnic group. **Ethnic minority background** is used throughout the report to refer to those respondents who do not identify as white.

[19] For further information see: www.gov.uk/browse/working/state-pension

Income (equivalised): Household incomes have been 'equivalised', that is adjusted (using the modified Organisation Economic Co-operation and Development scale) to reflect the number of people in a household. This allows the comparison of incomes for households with different sizes and compositions.

The EHS variables are modelled to produce a **Before Housing Cost (BHC)** income measure for the purpose of equivalisation. The BHC income variable includes:

Household Reference Person and partner's income from benefits and private sources (including income from savings), income from other household members, housing benefit, winter fuel payment and the deduction of net council tax payment.

An **After Housing Cost (AHC)** income is derived by deducting rent and mortgage payments from the BHC measure.

Income quintiles: All households are divided into five equal groups based on their income (i.e. those in the bottom 20%, the next 20% and so on). These groups are known as quintiles. These can be used to compare income levels of particular groups to the overall population.

Logistic regression: a regression model where the dependent variable is binary i.e. takes one of two values which are assigned as 0 or 1. The model predicts the probability of the dependent variable taking the value 1 for particular values of the independent variables. The regression coefficients are usually estimated using maximum likelihood.

Long-term limiting illness: This is consistent with the core definition of disability under the Equality Act 2010. A person is considered to have a disability if they have a long-standing illness, disability or impairment which causes substantial difficulty with day-to-day activities. This is variously referred to throughout the report as long-term limiting illness or disability, long-term illness or disability and long-term limiting disability.

Marital status:

- **single,** that is never married and never registered in a same-sex civil partnership,
- **married,** or in a registered same-sex civil partnership
- **separated,** but still legally married or in a same-sex civil partnership,
- **divorced,** or formerly in a same-sex civil partnership which is now legally dissolved
- **widowed,** or a surviving partner from a same-sex civil partnership

OLS (ordinary least squares or linear) regression: an approach for modelling the relationship between a continuous dependent variable and one or more explanatory

variables (or independent variables). The relationships are modelled using linear predictor functions whose unknown model parameters are estimated from the data using the least squares approach.

Overcrowding: Households are said to be overcrowded if they have fewer bedrooms available than the notional number needed according to the bedroom standard definition. See bedroom standard.

Personal well-being questions: Respondents were asked to give their answers on a scale of 0 to 10 where 0 is 'not at all' and 10 is 'completely'.

- Overall, how satisfied are you with your life nowadays?
- Overall, to what extent do you feel the things you do in your life are worthwhile?
- Overall, how happy did you feel yesterday?
- Overall, how anxious did you feel yesterday?

Self-reported health: How is your health in general? Is it...

- very good,
- good,
- fair,
- bad,
- very bad?

Tenure: In this report, households are typically grouped into three broad categories known as tenures: owner occupiers, social renters and private renters. The tenure defines the conditions under which the home is occupied, whether it is owned or rented, and if rented, who the landlord is and on what financial and legal terms the let is agreed.

- **owner occupiers:** households in accommodation which they either own outright, are buying with a mortgage or as part of a shared ownership scheme.
- **social renters:** this category includes households renting from Local Authorities (including Arms' Length Management Organisations (ALMOs) and Housing Action Trusts) and Housing Associations, Local Housing Companies, co-operatives and charitable trusts.

  A significant number of Housing Association tenants wrongly report that they are Local Authority tenants. The most common reason for this is that their home used to be owned by the Local Authority, and although ownership was transferred to a Housing Association, the tenant still reports that their landlord is the Local Authority. There are also some Local Authority tenants who wrongly report that they are Housing Association tenants. Data from the EHS for 2008-09 onwards

incorporate a correction for the great majority of such cases in order to provide a reasonably accurate split of the social rented category.

- **private renters:** this sector covers all other tenants including all whose accommodation is tied to their job. It also includes people living rent-free (for example, people living in a flat belonging to a relative).

Thermal comfort: an assessment from the surveyor as to whether a dwelling has both efficient heating; and effective insulation. Efficient heating is defined as

- any gas or oil programmable central heating
- electric storage heaters; or warm air systems
- underfloor systems
- programmable LPG/solid fuel central heating
- similarly efficient heating systems which are developed in the future

The primary heating system must have a distribution system sufficient to provide heat to two or more rooms of the home. There may be storage heaters in two or more rooms, or other heaters that use the same fuel in two or more rooms.

Because of the differences in efficiency between gas/oil heating systems and the other heating systems listed, the level of insulation that is appropriate also differs:

- For dwellings with gas/oil programmable heating, cavity wall insulation (if there are cavity walls that can be insulated effectively) or at least 50mm loft insulation (if there is loft space) is an effective package of insulation.
- For dwellings heated by electric storage heaters/LPG/programmable solid fuel central heating a higher specification of insulation is required: at least 200mm of loft insulation (if there is a loft) and cavity wall insulation (if there are cavity walls that can be insulated effectively).

The United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and Signifying compliance with the Code of Practice for Official Statistics.

Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs;
- are well explained and readily accessible;
- are produced according to sound methods, and
- are managed impartially and objectively in the public interest.

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

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July 2016

ISBN: 978-1-4098-4868-4