



***Understanding Society***  
**Working Paper Series**

**No. 2018-01**

**Some Indicators of Sample  
Representativeness and Attrition Bias for  
BHPS and Understanding Society**

**Peter Lynn & Magda Borkowska**

**Institute for Social and Economic Research, University of Essex**



# **Some Indicators of Sample Representativeness and Attrition Bias for BHPS and Understanding Society**

**Peter Lynn & Magda Borkowska**

## **Non-Technical Summary**

Understanding Society attempts to interview a sample of people each year in order to make it possible for researchers to study the many ways in which people's lives change over time. For research to be accurate, it is important that the sample of people interviewed reflects the population as a whole. This paper provides some indication of the extent to which the interviewed sample has the same characteristics as the overall population.

The analysis presented here has two parts. First, we compare the profile of the initially-interviewed sample with external estimates from the UK Censuses of Population. We do this separately for the British Household Panel Survey (BHPS) sample and the Understanding Society General Population Sample (GPS). The BHPS sample, who were first interviewed in autumn 1991, is compared with 1991 Census figures, while the GPS sample, first interviewed in 2009-2010, is compared with 2011 Census figures.

The second part of the analysis assesses the extent to which the sample re-interviewed each year continues to be representative of the initially-interviewed sample. We compare the profiles of the BHPS sample interviewed after 6, 12, 19 and 24 years (BHPS waves 7 and 13, and Understanding Society waves 2 and 7) with the initial sample. And we similarly compare the GPS sample interviewed after 6 years (wave 7) with the initial sample.

We find that the initial samples look reassuringly similar to Census estimates. The re-interviewed samples show modest under-representation of some groups, including the youngest age groups, men, non-whites, residents of Greater London and those on the lowest incomes. The GPS fares worse than the BHPS in terms of the effects of drop-out over time on representativeness.

# **Some Indicators of Sample Representativeness and Attrition Bias for BHPS and Understanding Society**

**Peter Lynn & Magda Borkowska**

## **Abstract**

The representativeness of the Understanding Society sample is assessed by means of both external and internal comparisons. External comparisons involve comparing the initially-interviewed sample with the most chronologically proximate Population Censuses. Internal comparisons involve assessing attrition over time from the initial sample. Analysis is restricted to the British Household Panel Survey (BHPS) sample, designed to represent Great Britain in 1991, and the Understanding Society General Population Sample (GPS), designed to represent the United Kingdom in 2009-10. Attrition is assessed over 24 years for the former, and 6 years for the latter. Results are mainly reassuring, though some differential attrition is detected.

Key words: attrition bias; panel attrition; sample composition; unit non-response

JEL classifications: C81, C83

Author contact details: [plynn@essex.ac.uk](mailto:plynn@essex.ac.uk)

Acknowledgements: The British Household Panel Survey (BHPS) was funded by the UK Economic and Social Research Council. Understanding Society: the UK Household Longitudinal Study is funded primarily by the UK Economic and Social Research Council with additional funding from a consortium of government departments. Data collection for BHPS was carried out by NOP (now GfK). Data Collection for Understanding Society waves 1 to 5 was carried out by NatCen Social Research, and waves 6 and 7 by TNS BMRB (now Kantar Public).

# Some Indicators of Sample Representativeness and Attrition Bias for BHPS and Understanding Society

Peter Lynn & Magda Borkowska

## Executive Summary

- The initial BHPS sample is broadly representative of the 1991 population: the only groups slightly under-represented are persons aged 60 or over and persons in Greater London;
- Levels of attrition from the BHPS sample are low: 70% of the initial sample were still participating after 12 years and 40% were still participating after 24 years;
- Attrition is greater amongst younger age groups, men, black people, people on lower incomes, and in the West Midlands;
- The initial GPS sample diverges from the 2011 population to a slightly greater extent than the BHPS sample: men, Greater London, and people with a severely limiting long-term illness are under-represented;
- The magnitude of sample attrition is greater for the GPS than it had been eighteen years earlier for the BHPS. While 78% of the BHPS sample were still participating after six years, only 52% of the GPS sample were still participating after six years;
- Attrition shows similar patterns for the GPS as for the BHPS. It is greatest amongst the youngest age groups, men, black people, people on lower incomes, and in Greater London;
- While the patterns are similar, the magnitude of differences in attrition rates between groups is greater in the GPS than in the BHPS. This is particularly noticeable for age groups, where the continuing participation rate after six years is 26 percentage points lower for 16-19 year-olds than for 60-69 year-olds in the GPS, compared to a difference of just 9 percentage points for the BHPS;
- There is no strong association between attrition rate and health status for either sample.

# 1. Introduction

This paper presents some indicators of the representativeness of the *Understanding Society* participating sample. The intention is that this will provide the reader with some idea of the extent to which the survey sample mirrors the population that it is intended to represent, at least in terms of some key indicators.

We restrict the analysis to what might be considered the two ‘core’ components of the sample, the original British Household Panel Survey (BHPS) sample, first interviewed in 1991, and the Understanding Society General Population Sample (GPS), first interviewed in 2009-10. This restriction allows to compare sample distributions with Census-based population estimates, as both these samples are designed to be representative of the total household population (of Great Britain, in the case of BHPS, and of the United Kingdom, in the case of the GPS).

For each of these two samples, two types of analyses are presented:

- Comparison between wave 1 participating samples and population Census data of the distribution of key variables;
- Comparison between sample subgroups of the rates of attrition over subsequent waves.

The intention is that the first set of analyses should present a picture of how successfully the participating sample initially reflects the characteristics of the population that it is intended to represent, while the second set of analyses demonstrates whether and how this has changed over time as more waves of data have been collected.

However, both these types of analyses are subject to some difficulties and some limitations. These are described in section 2 below. The substantive findings are summarised in section 3 and presented in full in a set of tables included as an annex.

## 2. Methodology

Two types of analyses are presented:

- Comparison between wave 1 participating samples and population Census data of the distribution of key variables;
- Comparison between sample subgroups of the rates of attrition over subsequent waves.

These two types of analyses are each carried out for two different samples:

- The original *British Household Panel Survey* (BHPS) sample, first interviewed in 1991;
- The *Understanding Society* General Population Sample (GPS), first interviewed in 2009-10.

For the former, we can study the effects on representativeness of 24 years of sample attrition, while for the latter we can study six years of attrition.

### **Census Comparisons**

We identified a modest set of key variables that are of substantive importance and are collected both on the relevant survey and the relevant population Census (1991 and 2011 for comparisons with BHPS and GPS respectively). However, there are some constraints on comparability that should be borne in mind:

- We have been restricted to drawing on Census publications. For most of the variables we wish to compare, published statistics are for the whole resident population, included people residing in communal establishments. However, the surveys sample only the household population, so there is a slight mis-match. This particularly affects the oldest age groups, where non-negligible proportions reside in communal establishments. Census estimates suggest that the proportion of the total population living in communal establishments was around 2.8 % in 1991 in Great Britain and around 1.8% in 2011 in the UK (the proportions were slightly higher for persons aged 16 and over).

- Some published statistics relate to subsets of our survey populations. Notably, Census statistics on people living in households with access to a car or van are restricted to persons aged 17 or over.
- There are some differences in methodology between the Census and the surveys that may affect comparability for some variables. For example, question wording differs for questions on health status and long-term illness, while the difference between self-reports (predominant in the survey data) and proxy reports (predominant in the Census data) may affect measurement of concepts such as ethnic group.
- For the GPS there is a substantial difference in time reference point. The Census refers to April 2011, while wave 1 field work was evenly spread between January 2009 and March 2011. For the BHPS, the time difference is smaller, with Census referring to April 1991 and field work taking place in September to December 2011.

These limitations are described fully in the notes to the tables in this paper (Annexes A to D).

For the BHPS, we present unweighted sample distributions. The sample was, almost, an equal-probability sample of persons currently residing in England, Scotland or Wales at the time of wave 1 field work (autumn 1991). We have also included in the tables the distributions after applying the survey analysis weights, but it is the unweighted distributions that should be compared to the Census figures to provide an indication of any likely non-response bias, as the analysis weights include an element of non-response correction.

For the GPS, we apply the design weights, as the design involved over-sampling Northern Ireland. We also present unweighted figures, to provide the reader with an indication of the effect of the Northern Ireland over-sampling. To indicate non-response bias, it is the design-weighted figures that we compare with Census figures.

### ***Attrition Analysis***

Estimating panel attrition rates is far from straightforward. A number of decisions and assumptions are necessary. In some cases these may affect different sample subgroups differently, which would confound the comparison of attrition between subgroups.

First, there are many different response rates that can be calculated, corresponding to all the different combinations of waves and survey instruments that might be relevant for different analysis purposes. We have chosen here to present rates that are relevant for longitudinal analysis of data from the individual or proxy interviews. Thus, the numerator for the attrition rates presented is the number of persons for whom an interview was obtained (personal or proxy) at the relevant data collection waves.

Second, calculation of the denominator requires some assumptions, as the eligibility status of sample members is not always known. As time passes, the proportion of sample members for whom eligibility status is unknown increases. For example, there are many BHPS sample members with whom we lost contact in the early 1990s, after the first two or three waves of the survey. To estimate the attrition rate at wave 7 of Understanding Society, in 2015-16, we should include in the denominator only those who are still alive and resident in a UK household in 2015-16. So it is necessary to estimate the proportion of non-respondents who would still be eligible to participate in 2015-16. We have done this in a way that is conservative and may, therefore, lead to under-estimated response rates. We have excluded from the denominator persons known to have died or moved abroad prior to the wave in question, and we have adjusted the number of non-respondents by a factor that reflects expected mortality in the sample based on cumulative published annual mortality rates for the age groups for which we present attrition rates. But we have not made any equivalent adjustment for under-identification of people who have moved abroad or moved into communal establishments. Our estimates therefore implicitly assume that there are no such people amongst the sample members who did not participate in the survey at any particular wave, which is unrealistic.

Finally, it should be noted that attrition rates, like all survey response rates, are sampled-based estimates that are subject to random sampling variation. Small differences in attrition rates between subgroups could therefore simply be the result of such random variation.



## 3. Results

### *BHPS Sample*

The sample of persons interviewed at wave 1 of BHPS is broadly similar to Census distributions in terms of sex, age, ethnic group, limiting long-term illness, government office region, economic activity status and presence in the household of a car or van (tables 1 to 5).

Where differences occur, they are small in magnitude. There is a modest under-representation of persons aged 60 or over (and corresponding over-representation of persons aged 30 to 49), and also slight under-representation of persons living in Greater London, persons who are economically inactive, and persons in households with no car.

Sample attrition is, overall, modest in magnitude. Almost 70% of sample members were still participating in the survey after 12 years, and 40% were still participating after 24 years (table 6). There are, however, some clear differences between subgroups in attrition rates (tables 6 to 9).

Attrition is consistently higher amongst men than amongst women, though the difference is not large in magnitude: after 24 years attrition rate differs between men and women by less than four percentage points (table 6). Attrition rate shows a linear relationship with age over most of the age range, being highest amongst the youngest age group, those who were aged 16 to 19 at wave 1, and lowest amongst those who were aged 50 to 59 (table 6). Though attrition appears to be greater amongst those initially aged over 60 than amongst those aged 50 to 59, this is most likely an artefact of under-identification of ineligibility, particularly due to death. Attrition is substantially higher amongst black people than amongst other ethnic groups (table 6), though this is a very small sub-sample (just 138 persons interviewed initially).

People who were in very poor health at the time of wave 1 appear to have a higher attrition rate than others (table 7). This group constitutes only 2.1% of the initial sample, however. Attrition rates differ very little between other levels of self-assessed health.

Some regional differences in attrition are apparent, with continued participation being lowest in the West Midlands (62% still participating after 12 years and 32% still participating after

24 years) and highest in the East of England (76% still participating after 12 years and 46% after 24 years) (table 8).

Attrition is greater amongst persons with lower personal incomes (as reported at wave 1). The continuing participation rate after 24 years ranges from 34.2% in the lowest income quintile to 46.6% in the top quintile (table 9).

## ***GPS Sample***

The GPS sample interviewed at wave 1 of Understanding Society is broadly similar to Census figures (tables 10 to 14), though there is a modest under-representation of males (45.4%, compared to 48.6%), Greater London (9.9%, compared to 12.8%), and people with a severely limiting long-term illness (8.6%, compared to 10.3%).

The magnitude of sample attrition is greater than it had been eighteen years earlier in the BHPS sample. While 78% of the BHPS sample were still participating after six years (1991 to 1997; table 6), only 52% of the GPS sample were still participating after six years (2009-10 to 2015-16; table 15). Attrition is, like in the BHPS sample, greatest amongst the youngest age group, those aged 16 to 19 at wave 1, and reduces with increasing age (table 15). While the pattern is the same, the relative differences between age groups are greater in the GPS than in the BHPS. Continuing participation rates after six years range from 35% of 16-19s to 61% of 60-69s in the GPS, compared to a much smaller range of 72% of 16-19s to 81% of 60-69s in the BHPS.

Attrition rates are greater amongst non-white ethnic minority groups than amongst white people, and are lowest of all amongst black people: the proportion still participating after six years is 54% amongst white people, 35% amongst black people, and between 38% and 43% amongst all other ethnic groups (table 15).

There is no strong association between attrition rate and health status (table 16).

Attrition is highest in Greater London (45% still participating at wave 7) and Wales (46%) and is lowest in Yorks and Humber, East of England and South East (all 55%) and South West (57%; table 17).

As for the BHPS sample, attrition is greater amongst persons with lower personal incomes (as reported at wave 1). The continuing participation rate after six years ranges from 45.3% in the lowest income quintile to 58.6% in the top quintile (table 18).

## Annex A: Initial Representativeness of BHPS Sample (1991)

Notes to Annex A tables: All figures are column percentages. BHPS figures based on persons with completed individual interview at wave 1 (n=9,897). Weighted proportions use `ba_xrwght` (analysis weight). Population figures are based on combined data from 1991 England and Wales Census and 1991 Scottish Census (persons 16+). Census figures refer to the total resident population, while BHPS only aimed to represent the household population (which, in 1991, accounted for approximately 97.2% of the total population). Thus, differences may be expected in subgroups where a substantial proportion of people reside in communal establishments (notably the oldest age group).

**Table 1 BHPS Wave 1: Sex, Age and Ethnic Group**

		Population Census (1991)	BHPS Wave 1 (1991) – unweighted	BHPS Wave 1 (1991) - weighted
<b>Sex</b>	<b>Male</b>	47.7	46.4	47.7
	<b>Female</b>	52.3	53.6	52.3
<b>Age in 1991</b>	<b>16-19</b>	6.6	6.6	6.5
	<b>20-29</b>	19.3	18.9	18.8
	<b>30-39</b>	17.4	19.2	18.0
	<b>40-49</b>	16.9	18.5	17.2
	<b>50-59</b>	13.3	12.7	13.2
	<b>60-69</b>	12.7	12.0	12.9
	<b>70+</b>	13.9	12.1	13.5
<b>Ethnic Group</b>	<b>White</b>	95.4	96.0	95.6
	<b>Black</b>	1.4	1.4	1.7
	<b>Other</b>	3.2	2.6	2.8

Notes: Figures for ethnic group based on n = 9,878 due to item missing data.

**Table 2: BHPS Wave 1: Limiting Long-Term Illness**

	Population Census (1991)	BHPS Wave 1 (1991) – unweighted	BHPS Wave 1 (1991) - weighted
<b>Yes</b>	15.8	13.4	13.9
<b>No</b>	84.3	86.6	86.1

Notes: The questions asked are substantially different in the two surveys:

Census: “Do you have any long-term illness, health problem or handicap which limits your daily activities or the work you can do?”

BHPS: “Does your health in any way limit your daily activities compared to most people of your age?”

**Table 3: BHPS Wave 1: Government Office Region**

	<b>Population Census (1991)</b>	<b>BHPS Wave 1 (1991) – unweighted</b>	<b>BHPS Wave 1 (1991) - weighted</b>
<b>North East</b>	4.6	4.7	4.5
<b>North West</b>	12.1	12.5	13.0
<b>Yorks &amp; Humber</b>	8.8	9.6	9.4
<b>East Midlands</b>	7.2	7.7	7.2
<b>West Midlands</b>	9.3	9.5	8.9
<b>East of England</b>	9.2	8.2	8.1
<b>Greater London</b>	12.2	10.5	12.9
<b>South East</b>	13.7	13.7	14.5
<b>South West</b>	8.5	8.9	8.5
<b>Wales</b>	5.2	5.3	5.0
<b>Scotland</b>	9.1	9.4	7.9

**Table 4: BHPS Wave 1: Economic Activity**

	<b>Population Census (1991)</b>	<b>BHPS Wave 1 (1991) – unweighted</b>	<b>BHPS Wave 1 (1991) - weighted</b>
<b>In Employment</b>	55.4	58.4	57.1
<b>Unemployed</b>	5.7	5.4	5.4
<b>Inactive</b>	39.0	36.2	37.4

**Table 5: BHPS Wave 1: Car or Van in the Household**

	<b>Population Census (1991)</b>	<b>BHPS Wave 1 (1991) – unweighted</b>	<b>BHPS Wave 1 (1991) - weighted</b>
<b>None</b>	25.9	23.9	25.9
<b>One</b>	43.8	46.6	43.4
<b>Two</b>	23.7	23.7	23.8
<b>Three or more</b>	6.6	5.7	6.8

Notes: All figures are based on persons aged 17 or older. The 1991 England and Wales Census and 1991 Scottish Census both of which only published data on car ownership for persons aged 17 or over. For BHPS, n = 9,704.

## Annex B: Representativeness over Time of BHPS Sample (Attrition 1991 to 2015)

Notes to Annex B tables: Cells entries for BHPS wave 1 indicate the number of sample members for whom an individual interview (personal or proxy) was successfully obtained. Entries for all other waves indicate the percentage of those interviewed at BHPS wave 1 for whom an individual interview was obtained at that wave. Ineligibility (died, moved abroad, institutionalised) is under-identified at later waves, with the consequence that response rates are under-estimates. The extent of the under-estimation is likely to increase over waves and to be greatest in the oldest age groups.

**Table 6: BHPS Attrition: Sex, Age and Ethnic Group**

		BHPS Wave 1 (1991)	BHPS Wave 7 (1997)	BHPS Wave 13 (2003)	Understanding Society Wave 2 (2010)	Understanding Society Wave 7 (2015)
<b>Total</b>		<b>10,264</b>	<b>78.3</b>	<b>69.9</b>	<b>51.0</b>	<b>40.0</b>
<b>Sex</b>	<b>Male</b>	<b>4,833</b>	<b>75.6</b>	<b>66.2</b>	<b>47.3</b>	<b>37.5</b>
	<b>Female</b>	<b>5,431</b>	<b>79.1</b>	<b>71.4</b>	<b>52.8</b>	<b>41.2</b>
<b>Age in 1991</b>	<b>16-19</b>	<b>696</b>	<b>71.7</b>	<b>58.9</b>	<b>42.0</b>	<b>30.8</b>
	<b>20-29</b>	<b>1,960</b>	<b>74.1</b>	<b>64.6</b>	<b>45.8</b>	<b>35.3</b>
	<b>30-39</b>	<b>1,972</b>	<b>79.0</b>	<b>69.6</b>	<b>49.9</b>	<b>39.1</b>
	<b>40-49</b>	<b>1,877</b>	<b>79.2</b>	<b>70.1</b>	<b>53.2</b>	<b>44.8</b>
	<b>50-59</b>	<b>1,298</b>	<b>76.7</b>	<b>70.8</b>	<b>57.5</b>	<b>47.0</b>
	<b>60-69</b>	<b>1,213</b>	<b>81.0</b>	<b>79.1</b>	<b>57.2</b>	<b>41.0</b>
	<b>70+</b>	<b>1,248</b>	<b>78.9</b>	<b>71.6</b>	<b>38.6</b>	<b>30.4</b>
<b>Ethnic Group</b>	<b>White</b>	<b>9,503</b>	<b>79.0</b>	<b>70.8</b>	<b>51.7</b>	<b>40.6</b>
	<b>Black</b>	<b>138</b>	<b>50.8</b>	<b>36.8</b>	<b>20.0</b>	<b>17.0</b>
	<b>Other</b>	<b>252</b>	<b>69.6</b>	<b>58.5</b>	<b>44.0</b>	<b>36.1</b>

Note: Ethnic group was not included in the proxy questionnaire, so analysis for this variable is restricted to sample members who completed the personal interview at wave 1.

**Table 7: BHPS Attrition: General Health Status**

	BHPS Wave 1 (1991)	BHPS Wave 7 (1997)	BHPS Wave 13 (2003)	Understanding Society Wave 2 (2010)	Understanding Society Wave 7 (2015)
<b>Excellent</b>	<b>2,930</b>	<b>77.2</b>	<b>69.2</b>	<b>49.8</b>	<b>39.8</b>
<b>Good</b>	<b>4,613</b>	<b>77.9</b>	<b>69.1</b>	<b>51.2</b>	<b>40.7</b>
<b>Fair</b>	<b>1,853</b>	<b>76.2</b>	<b>68.3</b>	<b>49.1</b>	<b>36.4</b>
<b>Poor</b>	<b>641</b>	<b>80.6</b>	<b>69.8</b>	<b>48.7</b>	<b>37.8</b>
<b>Very poor</b>	<b>219</b>	<b>73.8</b>	<b>66.0</b>	<b>48.0</b>	<b>27.6</b>

Note: General health status was not included in the proxy questionnaire, so the analysis for this variable is restricted to sample members who completed the personal interview at wave 1.

**Table 8: BHPS Attrition: Government Office Region**

	<b>BHPS Wave 1 (1991)</b>	<b>BHPS Wave 7 (1997)</b>	<b>BHPS Wave 13 (2003)</b>	<b>Understanding Society Wave 2 (2010)</b>	<b>Understanding Society Wave 7 (2015)</b>
North East	486	76.8	71.3	50.8	36.0
North West	1,284	77.2	69.2	51.3	40.5
Yorks & Humber	983	78.5	68.3	51.4	41.5
East Midlands	780	81.8	73.1	56.6	42.4
West Midlands	969	72.0	62.1	41.5	31.9
East of England	829	80.7	76.0	57.8	46.0
Greater London	1,093	74.0	65.2	47.8	38.6
South East	1,434	79.0	70.1	49.8	38.5
South West	916	80.1	72.4	53.7	44.5
Wales	533	79.2	70.4	48.3	38.7
Scotland	957	74.0	64.0	45.6	35.6

**Table 9: BHPS Attrition: Personal Income**

	<b>BHPS Wave 1 (1991)</b>	<b>BHPS Wave 7 (1997)</b>	<b>BHPS Wave 13 (2003)</b>	<b>Understanding Society Wave 2 (2010)</b>	<b>Understanding Society Wave 7 (2015)</b>
Top quintile	1,988	82.0	74.4	55.9	46.6
Second quintile	1,982	77.8	69.7	51.9	42.0
Third quintile	1,979	78.7	69.9	51.9	38.6
Fourth quintile	1,979	77.2	68.1	48.4	36.3
Bottom quintile	1,984	75.7	66.8	45.4	34.2

Notes: Income quintiles were derived from the variable `ba_fimngrs`, gross personal monthly income as reported at wave 1.

## Annex C: Initial Representativeness of GPS Sample (2009-10)

Notes to Annex C tables: Understanding Society figures based on persons with completed individual or proxy interview (therefore limited to people aged 16+ at time of first wave) from the General Population Sample (GPS), n = 43,674. Weighted proportions use a\_psnengp\_xd (design weight). Population figures are based on combined data from 2011 England and Wales Census, 2011 Scottish Census and 2011 Northern Ireland Census, unless otherwise stated. Census figures refer to the total resident population, whereas Understanding Society only aimed to represent the household population, which accounted for approximately 98.0% of the total population aged 16 or over in 2011. Thus, differences may be expected in subgroups where a substantial proportion of people reside in communal establishments (notably the oldest age group).

**Table 10: GPS Wave 1: Sex, Age and Ethnic Group**

		<b>Population Census (2011)</b>	<b>Understanding Society Wave 1 (2009-10) – unweighted</b>	<b>Understanding Society Wave 1 (2009-10) – design weighted</b>
<b>Sex</b>	<b>Male</b>	<b>48.6</b>	<b>45.4</b>	<b>45.4</b>
	<b>Female</b>	<b>51.4</b>	<b>54.6</b>	<b>54.6</b>
<b>Age in 1991</b>	<b>16-19</b>	<b>6.3</b>	<b>6.2</b>	<b>6.2</b>
	<b>20-29</b>	<b>16.8</b>	<b>14.6</b>	<b>14.8</b>
	<b>30-39</b>	<b>16.2</b>	<b>17.0</b>	<b>16.9</b>
	<b>40-49</b>	<b>18.1</b>	<b>18.9</b>	<b>18.9</b>
	<b>50-59</b>	<b>15.0</b>	<b>15.8</b>	<b>15.7</b>
	<b>60-69</b>	<b>13.3</b>	<b>14.4</b>	<b>14.4</b>
	<b>70+</b>	<b>14.3</b>	<b>13.1</b>	<b>13.1</b>
<b>Ethnic Group</b>	<b>White</b>	<b>88.7</b>	<b>91.3</b>	<b>91.0</b>
	<b>Black</b>	<b>2.7</b>	<b>2.2</b>	<b>2.3</b>
	<b>Indian</b>	<b>2.3</b>	<b>2.0</b>	<b>2.1</b>
	<b>Pakistani</b>	<b>1.5</b>	<b>1.2</b>	<b>1.3</b>
	<b>Bangladeshi</b>	<b>0.6</b>	<b>0.4</b>	<b>0.4</b>
	<b>Other Asian</b>	<b>2.0</b>	<b>1.1</b>	<b>1.1</b>
	<b>Mixed</b>	<b>1.3</b>	<b>1.0</b>	<b>1.1</b>
	<b>Other</b>	<b>0.9</b>	<b>0.7</b>	<b>0.8</b>

Notes: Figures for sex are limited to those living in Great Britain, as sex breakdown is not available in published tables for persons aged 16+ in the Northern Ireland Census. For sex, population figures based on combined data from 2011 England and Wales Census & 2011 Scottish Census (persons 16+). The question about ethnicity was not included in the proxy interview, therefore the ethnic group figures for Understanding Society include only persons who completed the individual interview (n = 41,047).

**Table 11: GPS Wave 1: Government Office Region**

	<b>Population Census (2011)</b>	<b>Understanding Society Wave 1 (2009-10) – unweighted</b>	<b>Understanding Society Wave 1 (2009-10) – design weighted</b>
<b>North East</b>	<b>4.2</b>	<b>4.6</b>	<b>4.7</b>
<b>North West</b>	<b>11.2</b>	<b>11.4</b>	<b>11.6</b>
<b>Yorks &amp; Humber</b>	<b>8.4</b>	<b>8.6</b>	<b>8.8</b>
<b>East Midlands</b>	<b>7.2</b>	<b>7.9</b>	<b>8.0</b>
<b>West Midlands</b>	<b>8.8</b>	<b>8.7</b>	<b>8.9</b>
<b>East of England</b>	<b>9.2</b>	<b>9.4</b>	<b>9.6</b>
<b>Greater London</b>	<b>12.8</b>	<b>9.4</b>	<b>9.9</b>
<b>South East</b>	<b>13.6</b>	<b>13.3</b>	<b>13.5</b>
<b>South West</b>	<b>8.5</b>	<b>8.7</b>	<b>8.9</b>
<b>Wales</b>	<b>4.9</b>	<b>5.3</b>	<b>5.4</b>
<b>Scotland</b>	<b>8.5</b>	<b>8.1</b>	<b>8.3</b>
<b>Northern Ireland</b>	<b>2.8</b>	<b>4.8</b>	<b>2.4</b>

**Table 12: GPS Wave 1: Limiting Long-Term Illness**

	<b>Population Census (2011)</b>	<b>Understanding Society Wave 1 (2009-10) – unweighted</b>	<b>Understanding Society Wave 1 (2009-10) – design weighted</b>
<b>Yes, limited a lot</b>	<b>10.3</b>	<b>8.7</b>	<b>8.6</b>
<b>Yes, limited a little</b>	<b>11.1</b>	<b>11.5</b>	<b>11.5</b>
<b>No, not limited at all</b>	<b>78.6</b>	<b>79.8</b>	<b>79.9</b>

Note: The question about limiting long-term illness was not included in the proxy interview, so analysis is restricted to respondents to the personal interview at wave 1 (n = 41,047).



**Table 13: GPS Wave 1: Economic Activity**

	<b>Population Census (2011)</b>	<b>Understanding Society Wave 1 (2009-10) – unweighted</b>	<b>Understanding Society Wave 1 (2009-10) – design weighted</b>
<b>In Employment</b>	<b>56.1</b>	<b>55.1</b>	<b>55.2</b>
<b>Unemployed</b>	<b>4.0</b>	<b>5.9</b>	<b>5.9</b>
<b>Inactive</b>	<b>31.7</b>	<b>32.7</b>	<b>32.6</b>
<b>Full-time students</b>	<b>8.2</b>	<b>6.2</b>	<b>6.3</b>

Notes: The Understanding Society category ‘full-time students’ includes everyone who chose ‘full-time student’ as the best description of their current employment situation (so, some full-time students could have chosen a different category as the best description of their current employment situation). In the 2011 Census classification, all full-time students are grouped in a separate category, regardless of whether they are economically active (employed or unemployed) or inactive.

**Table 14: GPS Wave 1: Car or Van in the Household**

	<b>Population Census (2011)</b>	<b>Understanding Society Wave 1 (2009-10) – unweighted</b>	<b>Understanding Society Wave 1 (2009-10) – design weighted</b>
<b>None</b>	<b>20.1</b>	<b>18.6</b>	<b>18.8</b>
<b>One</b>	<b>39.0</b>	<b>41.4</b>	<b>41.4</b>
<b>Two or more</b>	<b>40.8</b>	<b>39.9</b>	<b>39.7</b>

Note: Analysis restricted to Great Britain only, as information about ‘car or van availability in a household’ is not published for persons 16+ only for the 2011 Northern Ireland Census.

## Annex D: Representativeness over Time of GPS Sample (Attrition 2009-10 to 2015-16)

Notes to Annex D tables: Cells entries for wave 1 indicate the number of sample members for whom an individual interview (personal or proxy) was successfully obtained. Entries for all other waves indicate the percentage of those interviewed at wave 1 for whom an individual interview was obtained at that wave. Ineligibility (died, moved abroad, institutionalised) is under-identified at later waves, with the consequence that response rates are under-estimates. The extent of the under-estimation is likely to increase over waves and to be greatest in the oldest age groups.

**Table 15: GPS Attrition: Sex, Age and Ethnic Group**

		Understanding Society Wave 1 (2009-10)	Understanding Society Wave 4 (2012-13)	Understanding Society Wave 7 (2015-16)
<b>Total</b>		<b>43,674</b>	<b>64.7</b>	<b>51.9</b>
<b>Sex</b>	<b>Male</b>	<b>19,771</b>	<b>64.0</b>	<b>51.1</b>
	<b>Female</b>	<b>23,903</b>	<b>65.2</b>	<b>52.5</b>
<b>Age in 1991</b>	<b>16-19</b>	<b>2,701</b>	<b>51.3</b>	<b>35.3</b>
	<b>20-29</b>	<b>6,388</b>	<b>51.7</b>	<b>38.8</b>
	<b>30-39</b>	<b>7,407</b>	<b>64.2</b>	<b>49.8</b>
	<b>40-49</b>	<b>8,269</b>	<b>66.1</b>	<b>54.2</b>
	<b>50-59</b>	<b>6,891</b>	<b>70.8</b>	<b>59.6</b>
	<b>60-69</b>	<b>6,290</b>	<b>72.2</b>	<b>61.1</b>
	<b>70+</b>	<b>5,728</b>	<b>68.9</b>	<b>56.0</b>
<b>Ethnic Group</b>	<b>White</b>	<b>37,332</b>	<b>67.1</b>	<b>54.4</b>
	<b>Black</b>	<b>869</b>	<b>48.8</b>	<b>34.8</b>
	<b>Indian</b>	<b>818</b>	<b>54.9</b>	<b>41.1</b>
	<b>Pakistani</b>	<b>495</b>	<b>56.6</b>	<b>42.8</b>
	<b>Bangladeshi</b>	<b>176</b>	<b>45.2</b>	<b>38.4</b>
	<b>Other Asian</b>	<b>385</b>	<b>49.3</b>	<b>39.2</b>
	<b>Mixed</b>	<b>405</b>	<b>58.1</b>	<b>42.4</b>
	<b>Other</b>	<b>524</b>	<b>54.0</b>	<b>40.4</b>

Note: Ethnic group was not included in the proxy questionnaire, so analysis for this variable is restricted to sample members who completed the personal interview at wave 1.

**Table 16: GPS Attrition: General Health Status**

	Understanding Society Wave 1 (2009-10)	Understanding Society Wave 4 (2012-13)	Understanding Society Wave 7 (2015-16)
Excellent	8,022	63.1	50.9
Very Good	14,015	65.4	53.2
Good	12,068	65.6	52.7
Fair	6,356	64.8	50.9
Poor	3,150	61.5	46.7

Note: General health status was not included in the proxy questionnaire, so analysis for this variable is restricted to sample members who completed the personal interview at wave 1.

**Table 17: GPS Attrition: Government Office Region**

	Understanding Society Wave 1 (2009-10)	Understanding Society Wave 4 (2012-13)	Understanding Society Wave 7 (2015-16)
North East	1,990	63.9	53.0
North West	4,975	64.6	50.1
Yorks & Humber	3,774	65.2	54.7
East Midlands	3,452	69.3	53.9
West Midlands	3,782	62.6	51.2
East of England	4,095	67.5	55.0
Greater London	4,112	55.3	44.6
South East	5,786	66.2	55.0
South West	3,802	71.1	57.0
Wales	2,299	66.6	46.0
Scotland	3,519	59.9	47.9
Northern Ireland	2,088	63.1	51.3

**Table 18: GPS Attrition: Personal Income**

	Understanding Society Wave 1 (2009-10)	Understanding Society Wave 4 (2012-13)	Understanding Society Wave 7 (2015-16)
Top quintile	8,631	69.8	58.6
Second quintile	8,731	65.7	53.0
Third quintile	8,735	64.4	51.6
Fourth quintile	8,852	64.2	50.8
Bottom quintile	8,725	59.2	45.3

Note: Income quintiles were derived from the variable `a_fimngrs_dv`, gross personal monthly income as reported at wave 1.