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SYMPOSIUM PAPER

A symposium on Understanding Society, the UK Household Longitudinal Study: introduction

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Abstract

Understanding Society, the UK Household Longitudinal Study, began in 2009, and built on and incorporated its predecessor the British Household Panel Survey. It is the largest survey of its kind in the world and provides rich opportunities for economic research and policy analysis. In this introduction to a symposium on Understanding Society, we review the main features of the study, how it is conducted, and evidence on data quality. We also discuss past and potential uses in economic research.

Key words: UKHLS, panel survey, micro-data, intergenerational, families.

JEL codes: C81, C83

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1. Introduction

Understanding Society, the UK Household Longitudinal Study (UKHLS) employs annual surveys to track the same UK households and individuals over time. It began in 2009, and built on and incorporated its predecessor, the British Household Panel Survey (BHPS), which began in 1991. Data are collected on all members of participating households and the study has a genealogical design, meaning the offspring of participating parents are also tracked as they leave to form households of their own. At the time of writing (end of 2023), 13 waves of the UKHLS and 30 waves of the BHPS are available to researchers and analysts. Recent funding ensures the study will continue until at least wave 22 (to be released in 2032).

Researchers and policy analysts working in 2023 benefit from an incredibly rich data environment. They can draw on large cross-sectional surveys, often conducted by national statistical institutes. More and more, they have access to rich administrative data such as tax or social security records[1] or more generally 'naturally occurring' data[2] that result from economic, governance or social processes (rather than being created for research purposes). Finally, it has become increasingly feasible for individual researchers to launch smaller, hypothesis-driven surveys.[3] Nevertheless, for many areas of economic research and policy analysis, large, multi-topic longitudinal household surveys, such as Understanding Society, offer advantages over each of these alternatives.

Large cross-sectional surveys, such as the Labour Force surveys in the UK and Europe or the Current Population Survey in the US, have been an important source of data for economic research and policy analysis for many years. However, such cross-sections, even if repeated, offer limited opportunity to study dynamics, to distinguish between persistent heterogeneity and over-time mobility, to assess the impact of early-life events on later-life outcomes, to study the accumulation of advantage and disadvantage over the life course or the transmission of advantage across generations within families. Large, long-running longitudinal household surveys such as Understanding Society were developed precisely to allow the study of such questions.

Naturally occurring data, such as tax and benefits records, typically have large samples, and often offer precise measurement, wide coverage and a longitudinal

[1] Einav and Levin, 2014; Connelly et al., 2016.
[2] Gelman et al., 2014.
[3] Stantcheva, 2023.

dimension. Such data have supported much important recent research in economics. However, many concepts of research and policy interest will never be captured in naturally occurring data, as these concepts are not used in public or commercial administration. Obvious examples include individuals' expectations and beliefs (about future income, fertility and other outcomes), preferences (over risk and time), or subjective well-being. In many cases, naturally occurring data also miss the household or family context that studies such as Understanding Society offer. Another limitation of naturally occurring data is (in)security of supply (for example, administrative data can change when policy changes, preventing clean before–after comparisons; commercial data-owners can change their data sharing policies). Naturally occurring data are also often proprietary, or otherwise access-restricted, which can impede improvements in the transparency and replicability of economic research. Thus, there remains an important role for 'designed data collection' efforts – in the terminology of Groves (2011). Large-scale longitudinal studies are an important category of designed data collection. The value of designed data collection is perhaps especially high in the UK, because the available administrative data are not as rich as other Western nations (notably the Scandinavian countries).

Finally, large-scale longitudinal studies such as Understanding Society offer important advantages over smaller-scale, hypothesis-driven surveys mounted by individual research groups. There are returns to scale in data collection, and large, multi-domain data collection can support many research projects. To date, more than 1,100 published articles, and many more reports, book chapters, working papers and reports, have been identified from Understanding Society. Large-scale panel surveys are typically widely available (Understanding Society is freely available from the UK Data Archive), and so promote replicability and transparency in economic research. Many small-scale, hypothesis-driven surveys are based on convenience samples, which leaves the generalisability of the results unknown. In contrast, large-scale panel surveys such as Understanding Society are typically based on probability samples and, moreover, such studies have the resources to maintain a high level of quality assurance, making investments to minimise errors of both representation and measurement (a point which we return to below). Small-scale surveys typically have, at most, a limited longitudinal dimension. Finally, large longitudinal studies are based on infrastructure investment resulting in ongoing data collection, which means

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that when the economy experiences a major shock or significant policy change, both before and after data are collected.

In this introduction to a symposium on Understanding Society, we begin by outlining the key aspects of the UKHLS design and content. We summarise what has been collected, and how it has been collected. We also touch on, in some cases, the 'why' behind these design choices. We then review evidence on response rates and other data quality issues, and describe several ways in which the development of the study over time has been guided by methodological experiments and testing. Next, we discuss the particular strengths of Understanding Society for economic research (even among the set of large longitudinal household surveys) and highlight some illustrative uses of the data to date. We highlight how to access the data (along with a plea for correctly citing the data when used) and conclude with a brief description of planned developments for the study going forward.

The other papers in this symposium then discuss important aspects of the study in greater detail. The first two take up key methodological aspects of Understanding Society. An important feature of the study is that it is based on probability samples and so its design allows valid statistical inferences about populations of UK households and individuals. It is, however, not a simple random sample, but instead has a complex sampling design. Moreover, like any longitudinal survey, it suffers from some initial non-response and subsequent attrition. Lynn, Cabrera-Álvarez and Clarke (2023) discuss the considerable efforts that are made to deal with these challenges to statistical inference, including efforts to minimise attrition and the development of sophisticated survey weights. They also discuss approaches to analysing the data.

From the study's inception, notable features of Understanding Society have been innovation in measurement and design, and a commitment to evidence-based development of the study through systematic experiment and testing. One aspect of this is a separate sample for experimentation, the Innovation Panel; this has a design and content that largely mirrors that of the main survey, but it provides a basis for methodological testing (and also runs an annual competition for researchers to propose their own experiments or novel content). Jäckle, Burton and Couper (2023a) illustrate Understanding Society's evidence-based approach to innovation through a discussion of a particular area of current methodological research: the collection of data using mobile apps. Mobile apps offer the possibility of collecting more granular and/or more frequent data from participants.

However, a key issue in realising this potential is selective participation of study members in mobile app data collection. Jäckle et al. (2023a) discuss what has been learned, through careful study and experimentation, about the barriers to, and determinants of respondent participant in mobile app data collection.

The remaining three papers in this symposium discuss specific domains in which Understanding Society collects data and supports research. Like the BHPS before it, Understanding Society is an important source of income data in the UK. Its long panel structure allows for the estimation of rich models of income shocks and mobility ('income processes') and poverty dynamics. It is the data source for the UK's official Income Dynamics statistics. Fisher and Hussein (2023) describe how Understanding Society collects and compiles income data, and what is known about the quality of the resulting income data.

By design, Understanding Society is a biosocial survey, bringing together health data (both self-reported and more objective) with key socio-economic data. This allows for the study, in large probability of samples, of social and economic determinants of health, on the one hand, and the impacts of health on economic and social behaviours and outcomes, on the other. Benzeval, Aguirre and Kumari (2023a) discuss the collection of objective biological health measures ('biomarkers') and genetic and epigenetic information in Understanding Society, and review how such data can and could be used in health economics and related research.

Finally, with 30 waves of the combined BHPS/UKHLS now available (and funding secured for nine more waves), we have arrived at the point where the genealogical design of the study can support important research on the intergenerational transmission of advantage and disadvantage, in wealth, income, health, education and other domains. Levell and Sturrock (2023) illustrate this emerging strength with a particular focus on intergenerational wealth mobility.

2. Data collection

2.1. Main survey samples

Understanding Society now comprises five different probability samples of the UK population. A probability sample is one in which elements have known (though not necessarily equal) probabilities of selection. This allows the use of well-established statistical methods to draw valid inferences about the underlying population. The different samples

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complement each other, serving slightly different purposes. We now describe these samples and their purposes.

(1) The General Population Sample (GPS), recruited at wave 1, was designed to be a representative sample of the UK population with two parts: (i) a clustered and stratified, probability sample of approx. 24,000 households living in Great Britain in 2009–10; (ii) a simple random sample of approx. 2,000 households living in Northern Ireland in 2009 (selected with twice the selection probability as the Great Britain part).[4] This large sample was designed to support precise estimates of UK-level statistics, as well as supporting subgroup analysis.

(2) Even with a large sample, when some subgroups are small, estimates for those groups or comparisons between groups can be imprecise. The standard solution is to over-sample smaller groups (as the GPS does for Northern Ireland). The Ethnic Minority Boost Sample (EMBS), also recruited for wave 1, takes this strategy further. It was designed to oversample the five main UK ethnic groups (and consisted of approx. 4,000 households selected from areas of high ethnic minority concentration in 2009–10.) This was a two-stage recruitment process, with targeted households screened to ensure the recruited household had at least one member from an ethnic minority group.[5] Again, this approach is based on probability sampling, but with sufficient probability to ensure key subgroups are large enough to enable estimates of associations between and within them.[6]

(3) At wave 2 (2010), continuing sample members of the BHPS were invited to join Understanding Society, and about 8,000 households did. The original BHPS sample was a probability sample of British households, with a number of boost samples of Scotland, Wales and Northern Ireland added at key stages.[7] The inclusion of this sample in Understanding Society had several purposes, which included allowing for a long panel of subsample in the early years of the study, and, in time, facilitating intergenerational analysis, as we discuss below.

(4) At wave 6 (2015), an Immigrant and Ethnic Minority Boost (IEMB) sample was added to capture new immigrant and ethnic groups to the UK since the study started, as well as to

[4] Lynn, 2009.
[5] Berthoud et al., 2009.
[6] Benzeval et al., 2020a.
[7] Taylor et al., 2018.

re-boost the original ethnic groups. It followed a similar two-stage approach to the original EMBS and included approx. 2,900 households selected from areas of high ethnic minority concentration where at least one member was born outside the UK or was from an ethnic minority group.[8] Without this boost, the ability of Understanding Society to capture the contemporary UK population would have declined, because of the omission of immigrants arriving after the study began.

(5) At wave 14 (2022–23), a General Population Boost sample was added. This was designed in the same way as the wave 1 GPS with a target of 10,000 households, and recruitment is taking place with web and face-to-face modes. Unfortunately, difficulties recruiting interviewers post-pandemic has meant that this target was not achieved, with a (currently) estimated outturn of approx. 6,000 households. A key purpose of this boost was to offset sample losses due to cumulative attrition.

All household members recruited at any of the base waves for each sample are defined as original household members (OSMs) and are followed when they move outside of the household. People who move into an OSM household are considered temporary sample members (TSMs) and are interviewed for as long as they remain in the same household with the OSM. Until wave 14, if a female OSM had a baby with a TSM partner, the baby became an OSM and the father a permanent sample member (PSM), and both are followed in the same way as the original OSM. This was not the case for the children of OSM fathers and their TSM partners.[9] However, from wave 14, this following rule was made gender neutral, so the children of OSMs and their other parent are followed as OSMs/PSMs no matter what the gender of the OSM parent (which is how the rule was applied in the BHPS). These following rules help maintain the representativeness of the study, mirror family dynamics, and generate intergenerational linkages in the study.

2.2. Fieldwork

The fieldwork for one wave of the main survey runs for 24 months, although each household is interviewed annually. The Great Britain parts of the GPS and the EMBS are

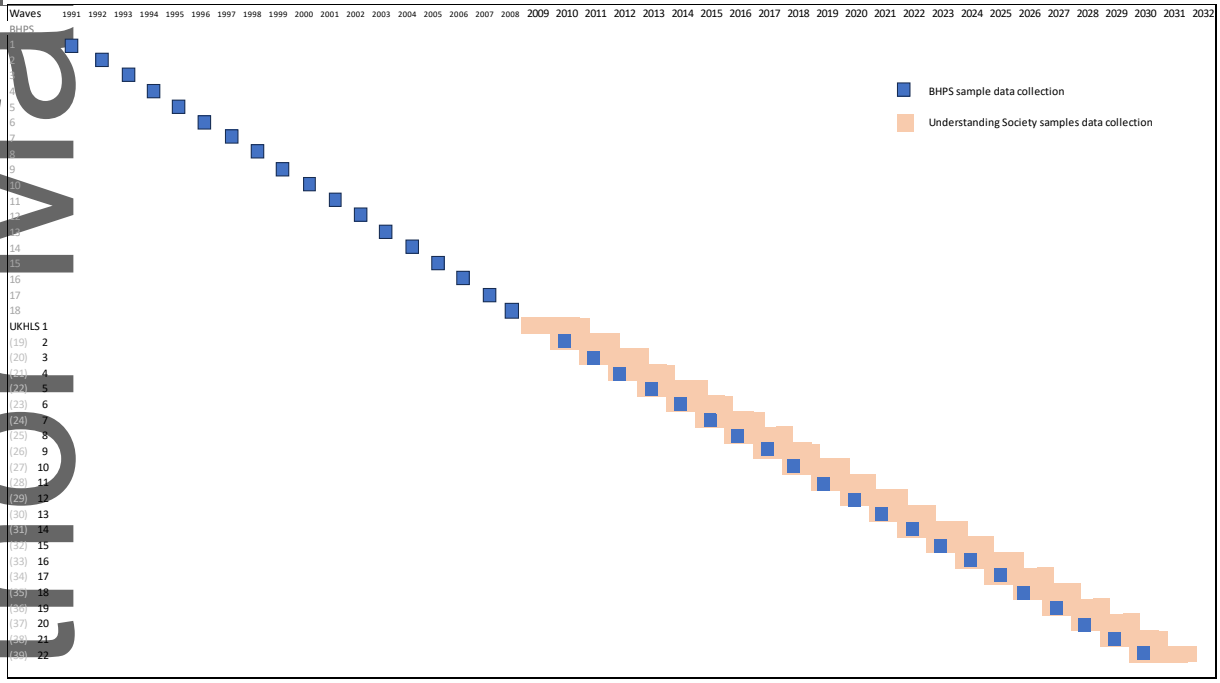
[8] Lynn et al., 2018.
[9] Lynn, 2009.

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issued across all 24 months, while the BHPS and Northern Ireland samples are issued over 12 months in year 1 and the IEMB sample over 12 months in year 2. Generally, a given household is issued to fieldwork in the same month each wave, so that the target is to have interviews one year apart. However, to maximise participation, efforts to reach a household continue for up to five months. This means that any time two waves of the study are in the field at once (and three waves for the first few months of the year). This contrasts with the BHPS, which was fielded in the autumn each year. Figure 1 shows the overlapping wave structure of Understanding Society, and how the BHPS has been incorporated into it, until the end of the current funding period.

Figure 1 Understanding Society waves of data collection 2009–32 (retrospectively incorporating BHPS waves 1–18, 1991–2008)



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Data collection consists of four components:

(1) It begins with the first adult being asked to complete a household interview, which includes a household grid and hence identifies all other household members to be interviewed. There are also some questions about the household. This step efficiently collects information that should not vary across household members.

(2) All adults aged 16 years and over are asked to complete an adult interview of about 40 minutes. Asking each member of the household (aged 16 and above) captures within-household variation directly from each individual household member. It avoids having one household member report for the others; such reports might not be reliable, and perhaps particularly so for subjective items (such as life satisfaction). This step also includes a self-complete section, which facilitates collection of data on sensitive topics.

(3) Children aged 10–15 years are given a paper self-completion survey to complete (which is currently being trialled online). This extends the age range covered by the study, and provides important data on crucial developmental years.

(4) Finally, if it is not possible to interview a participant, a proxy interview may be conducted with a suitable alternative. This ensures that at least some data are collected from as many sample individuals as possible.

The questionnaire and core participant materials are translated into nine languages. In the early waves of the survey, non-English interviews were conducted by a bilingual interviewer or with a translator. More recently, the web survey has been translated, allowing participants to complete the survey themselves in their first language.

All participants are given an incentive as a thank you for taking part; for most participants, this is an unconditional incentive given when invited to each year's survey. There are some early bird incentives for taking part on the web and previous-wave non-responders are given incentives conditional on taking part. Additional incentives are

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sometimes provided for undertaking extra data collection activities, such as data collection via mobile app.[10]

For the first seven waves of the study, fieldwork was face-to-face, with a mop-up telephone interview for some households. At the same time, the study team began a range of experiments on the Innovation Panel to investigate how to obtain the best quality data from a survey that used a mixture of face-to-face and web modes.[11] Prior to introducing 'mixed mode' (web or face-to-face) on the main survey, a random 20 per cent ring-fenced face-to-face sample was created to enable estimation of mode effects. At wave 7, previous-wave non-responders were issued to a web survey, and from wave 8 onwards, an increasing proportion of the sample were offered web-first interviews. Sample members were allocated to a web-first interview based on modelling of their propensity to take part. Whether offered web or face-to-face first, if there is no response in the initial mode after a period of time, participants are offered interviews in the other mode. There is also still a final telephone mop-up phase.

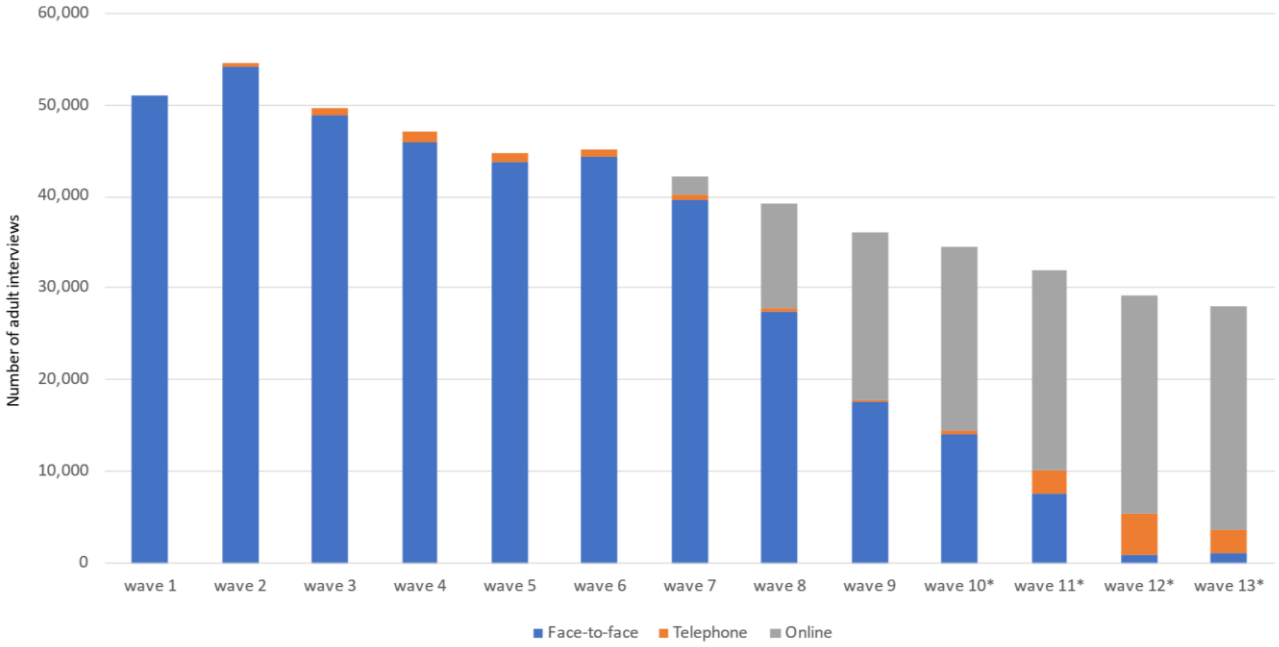
In March 2020, to meet the social distancing requirements of the pandemic, all face-to-face interviews ceased, and fieldwork continued by web and telephone only.[12] Face-to-face fieldwork restarted in April 2022, when only those people with a low propensity to take part on online (about 15 per cent) were offered face-to-face interviews first. It is hoped this will enable some sample members who missed the survey during the pandemic to re-engage with the study.

Figure 2 shows the number of completed adult interviews by mode. At wave 1, over 50,000 adult interviews were conducted, all face-to-face. At wave 2, the sample size increased with the inclusion of the BHPS, and a telephone mop-up mode was introduced, continuing a BHPS option for participants. Although, as noted in Section 4, response rates for previous-wave responders are approximately 90 per cent, cumulatively this leads to a decline in sample size over time. Against this, the incorporation of 'split-off' households, formed by the children of OSMs, increases the sample size over time, and the IEMB sample, introduced at wave 6, also increased the absolute sample size. Figure 2 illustrates the net effect of these factors.

[10] See Jäckle et al. (2023a).
[11] See Burton and Jäckle (2020) for an overview of this research.
[12] Burton, Lynn and Benzeval, 2020a.

Figure 2 also clearly shows the steep increase in online interviews from wave 7. This meant that the study was in a good position to stop face-to-face interviewing at the start of the pandemic without any break in fieldwork. Online interviews have dominated fieldwork during waves 11–13. While this balance is likely to readjust a little now that face-to-face interviews are possible again, Understanding Society will remain a web-first survey going forward.

Figure 2 Number of achieved adult interviews by mode, Understanding Society, waves 1–13



Note: An asterisk (*) denotes that part or all of these waves were conducted during the pandemic when face-to-face interviews were not possible.

2.3. Innovation Panel

The Innovation Panel is a separate survey, designed for experimental and methodological research.[13] Having a platform for such research that is both longitudinal and based on probability samples provides unique research opportunities. The Innovation Panel is a stratified and geographically clustered sample. However, unlike the main survey, this is a sample limited to England, Scotland (south of the Caledonian Canal) and Wales. It has a

[13] Lynn and Jäckle, 2019.

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smaller sample size and, given the more burdensome data collection, it suffers from greater attrition than the main survey. For this reason, a refreshment sample is added periodically.

As far as possible, the Innovation Panel's design, content, and data collection procedures are similar to the main Understanding Society survey. Each wave, there is a public call for applications to include experiments or new content in the survey. Each wave of the Innovation Panel therefore has multiple experimental studies in which individuals, households, interviewers or areas are randomly assigned to a particular instrument or survey procedure. Care is taken to ensure that the experiments do not affect each other, either by making treatments for different experiments explicitly orthogonal, or by using independent randomisation.[14]

Full details of the Innovation Panel design and all the experiments carried out to date can be found in the Innovation Panel user guide.[15]

2.4. COVID-19 survey

In April 2020, Understanding Society launched a frequent, web-based survey to understand people's experiences of the pandemic. All participants who had taken part in the preceding two waves (waves 8 and 9) were invited to take part in web interviews. Each web interview was held open for a week and a number of reminders were sent to encourage people to take part. In all, nine waves of data collection were carried out (April, May, June, July, September and November 2020, and January, March and July 2021). In March 2021, participants were asked to provide blood samples to test for COVID-19. For full information, see the COVID-19 study user guide.[16]

3. What has been measured?

The purpose of Understanding Society is to provide multi-domain data at the household and individual levels for social science and related policy research. At its inception, it was decided that Understanding Society should cover a broader range of topics than the BHPS. To accommodate this increase in content, without increasing the burden on participants, the study adopted a 'core and rotating' module approach. Core modules are those asked annually, and these capture content that either is expected to change relatively rapidly or is

[14] Lynn and Jäckle, 2019.
[15] Institute for Social and Economic Research, 2023a.
[16] Institute for Social and Economic Research, 2021.

so central to social science research that having accurate annual data is crucial. Rotating modules include content that is less liable to frequent changes and/or is less fundamental to all social science research and hence is not required annually.

To steer decisions about content, based on consultation with stakeholders and users, the study team has identified five priority domains of the study:

A. income, wealth, debt, benefits and tax;
B. education and training – participation and attainments;
C. employment and occupation – status and characteristics;
D. family structures and relationships within and outside the household;
E. health – different domains, behaviours and use of services.

The study also collects data on supporting topics, which are important to social sciences (for example, UK Research and Innovation/Economic and Social Research Council priority areas) but less frequently researched. These are carried out on a less regular and/or less in-depth basis. These include:

- housing and consumption;
- digital lives;
- political and civic engagement (with a specific voting module run immediately following a general election);
- environmental behaviours and attitudes;
- social support and networks;
- neighbourhood characteristics and belonging;
- transport ownership and commuting behaviours;
- identity, attitudes and values.

Full details of the core and rotating modules are available in the Long Term Content Plan, available on the Understanding Society website.[17]

In addition to the core and rotating modules, there are a set of 'initial conditions' modules for new household members that capture their experiences to date. This includes

[17] See https://www.understandingsociety.ac.uk/sites/default/files/downloads/general/long-term-content-plan.pdf.

complete histories of their partnerships, fertility and employment. There are also one-off or periodic modules on characteristics that are relatively stable, such as psychological traits, identity and sexual orientation.

In general, all participants are asked the same modules, with two exceptions. There is an additional module for young adults aged 16–21 to link the youth and the adult data. Finally, participants in both ethnic boost samples and selected respondents from the GPS are asked an extra five minutes of questions relevant to ethnic minorities living in the UK.[18]

3.1. Data on children

The youth survey for children aged 10 to 15 years includes questions around behaviours, leisure activities, activities and relationship with family, friends, schoolwork, well-being and future plans. For children aged under 10 years, parents (usually mothers) are asked about the child's development and behaviour at ages 1, 3, 5 and 8 years. Mothers are also asked about their own health and behaviours during pregnancy, as well as some details about conception and birth.

3.2. Biomarker and genetics data

In wave 2 for the GPS and wave 3 for the BHPS, there was a follow-up nurse interview about five months after the main interview. This collected a range of physical measures and blood samples to provide biomarker and genetic information for the study.[19] In the twelfth wave of the Innovation Panel (IP12), the survey team experimented with participant-led collection of biomarkers,[20] with some additional experiments at IP15. The successful protocols are being rolled out on to the main survey at wave 16.[21]

3.3. Linkage of naturally occurring data

Since its inception, Understanding Society has aimed to augment the study with naturally occurring (mainly administrative) data. Participants have been asked for their consent for a wide range of different linkages, which can create two broad sets of research opportunities.[22]

[18] McFall, Nandi and Platt, 2020.
[19] Institute for Social and Economic Research, 2022a, 2022b.
[20] Al Baghal et al., 2021a.
[21] Benzeval et al., 2023a.
[22] Benzeval et al., 2020b.

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(1) Validation – comparing survey and administrative data enables researchers to assess the quality of one or both sources of data. For example, administrative records may provide more accurate estimates of the benefits people receive, or their tax bill, than they are able (or willing) to recall in a survey, or more detailed descriptions of disease conditions and treatments. However, administrative records are not always more accurate than survey reports (for example, some individuals could be more truthful or complete in survey reports than in income tax returns). Administrative data do not necessarily have full population coverage (e.g. only have records on those who attend health service or apply for benefits). Linking data from the two sources, therefore, may provide information on the validity and coverage of data in each, and identify areas where improvements in surveys or administrative records may be of value.

(2) Enhancement – integrating data from survey and administrative records can create new research opportunities from the combined data that are not possible in one source alone. Administrative records may provide information that survey participants do not know directly themselves, for example, exact diagnosis and treatments for health conditions, precise scores in within-school exams. However, administrative records in one domain (e.g. health) often have very limited information on other aspects of people's lives (e.g. income, household circumstances) – perhaps just key characteristics and address – so it is not possible within these data to investigate how a health condition or treatment might affect other domains of life such as employment or caring responsibilities.

Understanding Society enables linkage to external data sources via four routes:

(1) During the interview participants are asked their consent to link to a wide range of administrative data sources. For example, linked data are currently available for education, NHS records, financial credit histories, car information from vehicle registrations and auto-enrolment pensions. Negotiations for linkage with benefits (Department for Work and Pensions) and tax (HM Revenue and Customs) data are ongoing. Each dataset has slightly different access arrangements based on the requirements of the administrative data owner. Further information can be found on the Understanding Society website.[23]

[23] See https://www.understandingsociety.ac.uk/documentation/linked-data.

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(2) Participants are also asked about various organisations they engage with, for example, schools and universities for children, and firms for those in employment. These organisation identifiers are generally in the released special licence files, which enable researchers to link to published information (e.g. Ofsted reports). Participants have also been asked for the name and address of their employer to link to business databases; negotiations for this are ongoing.

(3) Participants' household address is linked to public information about that address. For example, the data participants provide about their council tax payments are augmented by linking to published council tax bands and rates.

(4) Finally, based on the household address, a wide range of geographical identifiers are made available through UK Data Archive special licence applications to provide indicators on local authorities, travel-to-work areas, parliamentary constituencies, etc. Further information can be found on the Understanding Society website.[24]

Obtaining administrative linkages is a challenging process and can take many years to negotiate. The survey team continues to work with data owners, funders and linkage platforms to bring key linkages – such as tax and benefit records – to fruition.

3.4. Derived data

From the data collected and linked, the study team creates several cross-wave files to facilitate different analyses. The most straightforward of these is the 'calendar year file', which combines data across waves from the annual questions, so that time series analyses of calendar years can be conducted more easily.[25] Others include regularly updated 'histories'; for example, a partnership history file is available.[26] As another example, to make it easier for researchers to follow children's development through childhood, a cross-wave child file has been created, which brings together all information collected about a child before the age of 10 years, no matter which adult in the household provided it.[27] To facilitate studies of intergenerational transmission and other research that links family members across separate households, a family matrix has been developed to identify the

[24] See https://www.understandingsociety.ac.uk/documentation/linked-data/geographical-identifiers.
[25] Institute for Social and Economic Research, 2022c.
[26] See Nandi et al. (2023).
[27] Institute for Social and Economic Research, 2023b.

familial relationships between sample members, whether or not they are in the same households.[28] Information on the more specialised datasets produced can be found on the Understanding Society website.[29]

4. Data quality

Understanding Society uses the total survey error (TSE) framework[30] as a way of conceptualising the issues that need to be investigated in assessing the quality of a survey. The TSE framework includes two dimensions, which map on to the two biggest challenges in longitudinal data collection:

- Errors of representation – which might be due to coverage errors, sampling errors, non-response errors or adjustment errors. In a longitudinal context, the most significant of these is likely to be attrition, and biases within this, which cumulate over time, reducing the ability of a study to be representative of its target population and/or reducing researchers' ability to investigate small population subgroups.
- Measurement errors – which might be due to specification errors, reporting errors or processing errors. A fundamental tension in all longitudinal studies is between consistent measurement of key concepts over time against the need to improve measurement either as concepts change or as new knowledge about the best ways of measuring them is created.

A crucial feature of Understanding Society is that its scale enables the study team to investigate these quality issues and report on them regularly for users. In the following, we highlight some headline findings for each dimension.

4.1. Response and response bias

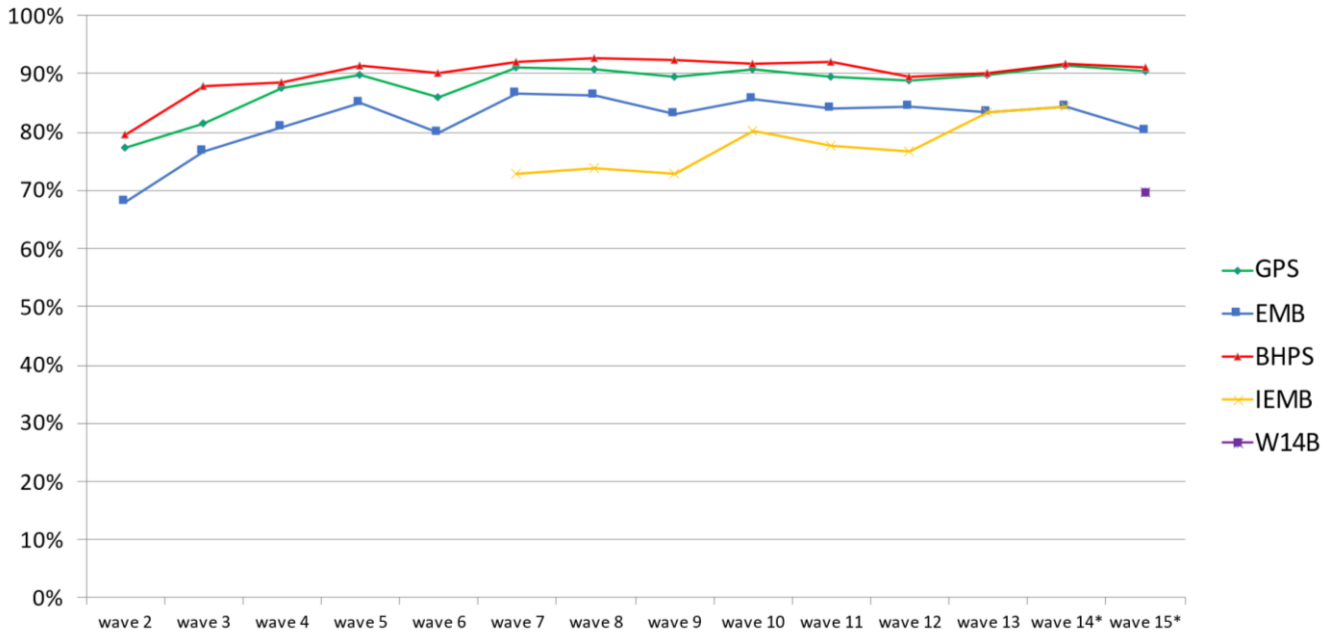
The Understanding Society team monitors a range of response variables to track participation over time, and to identify samples, or subgroups, that have higher non-response than others so that interventions can be designed to try to address this. These

[28] See Institute for Social and Economic Research (2022d) for further information.
[29] See https://www.understandingsociety.ac.uk/documentation/data-releases.
[30] Biemer, 2010.

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data are published in detail annually.[31] Figure 3 shows the year-on-year response rates (or retention rates) for the study. After the first couple of waves, year-on-year response rates for previous-wave responding households for the GPS and BHPS samples have stabilised around 90 per cent, and around 80–85 per cent for the ethnic minority boost samples. These response rates did drop by a couple of percentage points during the pandemic, but efforts are currently being made to re-engage participants lost during that period. Response rates for previous-wave non-responders are around 30 per cent, showing that it is possible to encourage people back into the study after a break in their participation.

Figure 3 Household response for previous-wave responding households (in per cent), by sample, Understanding Society waves 1–15



Note: An asterisk (*) denotes still in field (data extracted October 2023).

Response rates have been declining over time worldwide, but compared with other concurrent longitudinal UK studies, Understanding Society has performed on par or better than most.[32] However, there is differential attrition among some groups. The study team

[31] Cabrera-Álvarez, James and Lynn, 2023.
[32] See the second figure in Box 2 of Benzeval et al. (2020a).

has implemented a range of initiatives and experiments to reduce such response bias.[33] In addition, the study team produces a wide range of inverse probability weights.[34] Adjustments to the design weights to deal with differential attrition draw on the very rich data available from prior waves to model non-response, and this is one of the advantages of a longitudinal study. More details can be found in Lynn and Kaminska (2010).

Different analyses of non-response and attrition have been conducted for different waves and samples. Lynn and Borkowska (2018) compared the BHPS and GPS samples, at wave 24 for the BHPS and wave 7 for the UKHLS, respectively, to 2011 Census estimates. The reinterviewed samples showed modest under-representation of some groups, including the youngest age groups, men, non-White individuals, residents of Greater London and those on the lowest incomes. James (2022) shows that participants who have remained in the BHPS sample since wave 1 (26 waves when the analysis was conducted) were older (particularly pensioners), more educated, from smaller household sizes, and reported fewer household moves. Cabrera-Álvarez et al. (2023) investigated the drop in participation between waves 1 and 11 for the GPS sample. They found that attrition was particularly noticeable among younger people, panel members with an ethnic minority background, those on lower incomes or those with no qualifications. However, the survey weights were able to reduce the impact of attrition.

4.2. Measurement quality

A significant effort was made to investigate and test how best to measure key concepts in advance of wave 1.[35] A further major review of measurement across the study's concepts was undertaken prior to introducing mixed-mode data collection, in order to identify concepts subject to mode effects and to adapt their design to minimise these effects.[36] The team has also carried out experiments to improve and test the measurement of key concepts, such as cognition,[37] and to update content to keep pace with real-world changes while trying to ensure longitudinal consistency with the past, for example with environmental behaviours.[38]

[33] Benzeval et al., 2020a.
[34] Lynn and Kaminska, 2010.
[35] Gray et al., 2008.
[36] Abbassian et al., 2019.
[37] Al Baghal, 2019.
[38] Poortinga, 2022.

Author Manuscript

Post-fieldwork, the study team undertakes a wide range of quality control processes as part of preparing data for release to researchers. For some key concepts, validation analyses have been undertaken, either by the study team or by independent researchers. As noted above, Fisher and Hussain (2023) outline the income production process including quality control to external sources, and demonstrate how closely the income measures in the UKHLS compare to those in the Family Resources Survey (which is generally considered the gold standard for cross-sectional income data in the UK). Postel-Vinay and Sepahsalari (2023) show that Understanding Society closely tracks Office for National Statistics (ONS) data (from the Labour Force Survey) for both labour market stocks (that is, employment, unemployment and inactivity rates) and labour force transitions (for example, the work to unemployment transition rate).

4.3. Continuous improvement through innovation and evidence-based design

The conduct and development of Understanding Society is underpinned by rigorous research, and a programme of innovation to ensure the study is continually providing new research opportunities for users. Such research can broadly be grouped into three types.

First, significant effort is put into researching appropriate methods for producing the best-quality data for the main survey via experiments on Innovation Panel and/or on the main survey itself. Experiments are only included on the main survey if it is believed that the treatments will do no harm to panel retention. Key areas of this research include:

- initiatives to improve response and reduce response bias,[39] including how to design boost surveys;[40]
- introducing mixed-mode design;[41]
- improving informed consent to data linkage;[42]
- experiments to improve response for key measures.[43]

Second, the Innovation Panel is a platform for broader methodological experimentation by the study team and outside researchers. Many experiments relevant to

[39] See, for example, Lynn (2015).
[40] Lynn et al., 2018; Williams et al., 2022.
[41] See an overview in Burton and Jäckle (2020).
[42] See, for example, Jäckle et al. (2023c).
[43] See, for example, Al Baghal and Lynn (2015) and Benzeval et al. (2023b).

economics research have been carried out. For example, Hernández-Alava and Pudney (2023) included a randomised experiment focused on different designs of the EQ-5D (a quality-of-life scale used in for cost–benefit analysis in health economics) to inform a new version being considered by the National Institute of Clinical Excellence. Galizzi, Machado and Raffaele (2016) included a longitudinal experiment of different ways of measuring risk preferences. Burton et al. (2020b) investigated the use of an editable summary screen to reflect income responses back to respondents, by category and in total, to allow them an opportunity to change their answers.

Finally, Understanding Society has a programme of enhancement projects, which aim to create or capture novel data, including additional samples, data on new topics or new sources of data. For example, projects have sought consent to link and extract data from social media in ways that can be shared with users.[44] Apps have been used to collect data on a range of topics – well-being, body shape, finance, cognition.[45] A new survey of 'significant others' (sample members' partners who they live with and non-resident co-parents of sample members' children) goes into the field in January 2024. Finally, a monthly survey is in development in which participants are asked about key events that may have happened to them (e.g. pregnancy), and if they report an event, they are asked a series of follow-up questions. This 'event-triggered data collection' enables the study to collect information, such as expectations, plans and subjective well-being, that respondents may not remember or which may have changed by the date of their annual questionnaire.[46]

5. Strengths and opportunities for research in economics and policy analysis

As a source of data for economic research, Understanding Society has unusual strengths.

5.1. Full coverage of the life cycle, life events and members of the household

Data are collected directly from *all* household members over the age of 10, while information on younger members of the household is collected from parents or responsible adults. At the other end of life, the study does have participants aged over 100. While

[44] Al Baghal et al., 2020, 2021b.
[45] Jäckle et al., 2023a.
[46] Jäckle, Burton and Couper, 2019; Jäckle et al., 2023b.

efforts are made to collect data from participants living in institutions, apart from prisons, response rates are low. As a result, the proxy interview has been adapted for people in care homes, and, from wave 13, for participants who have entered a care home, an attempt is made to collect the name of that institution, allowing possible data linkages (for example to Care Quality Commission reports). Thus, the data support research right across the life cycle. Related to this, Understanding Society is one of the few studies in the UK that follows people before they have children, during pregnancy and birth, and then during the child's life in their family context thereafter, creating valuable research opportunities the study team is enhancing.[47]

The attempt to interview every member of each sample household contrasts with some large panel studies (the Panel Study of Income Dynamics is an example) that are only able to collect data primarily from a single member of the household (who reports also for their spouse and other members of the family). Interviewing each member of a household is a particular advantage for measures, such as mental health and life satisfaction, for which a report from another family member may be less reliable. For example, using data from Understanding Society and the BHPS, Bencsik, Halliday and Mazumder (2023) investigate intergenerational mobility in health in the UK. They find that parental mental health holds more influence over their children's health status than parental physical health, and that this influence becomes more pronounced during the child's teenage years. The research also suggests that disparities in health among families may fade away within three generations. In the policy realm, the Department for Work and Pensions (2023a) uses Understanding Society data in its reporting on progress towards supporting workless families. It includes data on a range of indicators which require information on the whole family, for example the number of children who have parents with mental health problems or poor relationship quality.

5.2. Annual frequency and long time-span

Data are collected from individual household members annually, and an attempt is made to collect data each year from each household at the same time of year. This provides data with annual frequency, and at approximately equal time intervals across the sample and over the years, facilitating the estimation of models of change. In Understanding Society, 13

[47] Benzeval, 2019.

Author Manuscript

waves of the data (covering 14 years due to the overlapping structure) have now been released, extending back to 30 years for the BHPS sample (see Figure 1). Within the Understanding Society samples, over 21,000 adults and children interviewed at wave 1 were still in the study and interviewed at wave 10. This facilitates the estimation of models with rich dynamics. For example, Kaiser (2020) analysed the dynamics of income and its impact on life satisfaction over the long term using data from UKHLS (1996–2017) and the German Socio-Economic Panel (SOEP; 1984–2015). He found no evidence of individuals adapting their life satisfaction to changes in their own income, while the influence of peers' income was consistently negative effect over time. This was true in both the UK and Germany. The Department for Work and Pensions (2023b) again makes extensive use of Understanding Society data in fulfilling its statutory responsibility to provide data on income dynamics. It produces data on rates of persistent low income for children, working-age adults and pensioners, based on a rolling analysis of four consecutive annual interviews. These calculations have the status of a National Statistic.

5.3. Rich economic content

The five priority domains of income, employment and other labour market outcomes, education, family and health are all active areas of economic research. Like the BHPS before it, Understanding Society has supported important research on income and poverty dynamics in the UK.[48]

In terms of labour market outcomes, Postel-Vinay and Sepahsalari (2023) argue that Understanding Society has a number of advantages of the Labour Force Survey for studying labour mobility, notably that Understanding Society allows for analysis at monthly (rather than quarterly) frequency. They use Understanding Society and the BHPS to document the evolution of labour market stocks and flows from 1992 to 2017. They also examine the wage returns to industry and occupational tenure. Costa Dias, Joyce and Parodi (2020) use Understanding Society (and the BHPS) to study the gender pay gap in the UK. They show that differences in full-time experience are the main driver of the gender pay gap among college graduates in the UK.

[48] See Avram et al. (2022) and the additional examples cited in Fisher and Hussein (2023).

Author Manuscript

From the outset, Understanding Society has also had a bio-social focus. Rich self-reports of health outcomes, behaviours and risk factors are collected. Importantly, these are further supplemented by the collection of biomarkers. This is further discussed by Benzeval et al. (2023a). For instance, Eibich et al. (2022) examined the interplay between testosterone levels and employment dynamics, addressing potential endogeneity issues by using genetic data as instrumental variables. This analysis validates the negative impact of testosterone on unemployment risk among both employed and unemployed men. In another example, as part of the IFS Deaton Review, Banks, Karjalainen and Waters (2023) used Understanding Society data to document inequalities in disability over the life cycle.

Even for a multi-domain longitudinal study of this type, Understanding Society has unusually broad content, because of its rotating modules and other non-priority domain content. The breadth generates further possibilities for economic research. For example, Fetzer (2019) uses data on political preferences to examine the relationship between district-level variation in the impact of austerity cuts and support for the UK Independence Party (UKIP). He provides evidence that austerity was a driver of support for Brexit. Another example reflects the inclusion of sexual orientation questions as a rotating module. Urwin, Mason and Whittaker (2021) find that individuals who change their sexual orientation over time experience lower health and well-being outcomes compared with those who report a consistent orientation. Howley and Waqas (2022) used 'initial conditions' data on national identity to investigate the impact of immigration on life satisfaction, by augmenting the data with local statistics on the number of immigrants in local areas. Participants with a stronger attachment to an English/ethnic identity had larger estimated adverse mental health effects associated with immigration than those who thought of themselves as 'British'.

As noted above, the content of the data is further broadened by data linkage. A nice example is Greaves et al. (2023), who exploit the linkage of Understanding Society to administrative data on school performance. An important question is whether parents view school quality as a complement or substitute to their own inputs in the production of their children's human capital. Greaves et al. show that when parents receive a positive signal about school performance (measured in the linked administrative data), they reduce their time inputs to their children (as measured in the survey.)

Like the rotating modules, special one-off studies, such as the COVID-19 study, can open up new avenues for economic research. Crossley, Fisher and Low (2021) and Crossley et al. (2023) used data from the COVID-19 study to characterise the prevalence of economic hardship across different groups and through the course of the pandemic. Etheridge et al. (2023) explored the link between work-at-home productivity, job characteristics and individual traits. They show that those in managerial roles and working at large firms (that is, in 'good jobs') are advantaged with respect to work-at-home productivity. Additional research based on the COVID-19 study has also offered valuable insights into the impact of the pandemic on both mental health and labour dynamics. For instance, Chaudhuri and Howley (2022) examined the effects of COVID-19 vaccination on mental well-being. They found that COVID-19 vaccination significantly improved mental health, particularly among older and clinically vulnerable groups, who were at higher risk of severe COVID-19 outcomes. Braakmann, Eberth and Wildman (2022) analysed the influence of newly revealed occupational risks associated with COVID-19 mortality on worker behaviour. Workers in high-risk occupations, particularly for those unaffected by lockdowns, left these roles during 2020. This shift in worker behaviour was not attributed to negative health shocks or employer-initiated separations. Carrillo-Tudela et al. (2023) show that workers changed the target occupations and industries of their job search as the pandemic progressed. They find that non-employed searchers are more attached to prior occupations and job-seekers with lower education are more likely to target declining occupations. This suggests that employed and better-educated workers are better able to navigate the shifts in labour demand brought on by the pandemic.

Fumagalli and Fumagalli (2022) is a good example of a behavioural economics experiment in the Innovation Panel. They examine how reference groups affect life satisfaction. In particular, the treated group is prompted to compare themselves to a reference group of the same gender, while the control group is not instructed to consider a particular reference group. They find that, for women, being prompted to consider a same-gender reference group leads to higher income and leisure satisfaction. The same effect is not seen for men. This finding is interesting because in many Western countries, women's self-reporting well-being (SWB) has fallen relative to men's in recent decades. The results of Fumagalli and Fumagallli suggest a plausible explanation: as women have entered the

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labour force in increasing numbers, they have shifted their reference comparison group to men.

Finally, a range of policy uses of the rich economics data can be illustrated. For example, descriptively, the Bank of England has included trend data from the BHPS and Understanding Society in its analysis of families' ability to pay their mortgages,[49] while the ONS includes well-being data from the study, in their National Indicators datasets.[50] More analytically, the Northern Ireland Department of Economy commissioned research using Understanding Society data to investigate the impact of parental leave on labour market outcomes. Using 10 waves of data, they find that married parents are more likely to take parental leave than single parents; those working for the government or the NHS are more likely to take leave than those in the private sector; and those on higher levels of pay are more likely to take shorter periods of leave than others, although there are gender differences in this.[51] The Office for Students commissioned research which drew heavily on Understanding Society to investigate the returns to higher education. They found higher levels of 'soft outcomes' (personal well-being, mental health, confidence, social capital and community cohesion) among people with higher education, but many of these differences were accounted for by confounding factors such as age, occupation and income.[52]

5.4. Intergenerational linkages

Because of the sample following rules, many children, and even grandchildren, are now study participants. For example, the study contains nearly 4,000 individuals in three generations and over 58,000 individuals in two-generation families. Understanding Society data, particularly when combined with the BHPS, now provide a valuable resource to study intergenerational connections, and the intergenerational transmission of economic advantages and disadvantages. For example, Rohenkohl (2023) finds evidence of intergenerational persistence in the transmission of resources at the household and individual levels. While mobility is relatively low at the UK level, within specific regions there is variability. For example, regions in the south of England have much higher levels of mobility than those in Northern England. See Levell and Sturrock (2023) for an investigation

[49] Bank of England, 2023.
[50] Office for National Statistics, 2023.
[51] Dickey and Millar, 2023.
[52] State of Life, 2023.

of intergenerational transmission of wealth. In the policy sphere, Understanding Society data on intergenerational occupational mobility have been used as evidence by the Social Mobility Commission (2023).

5.5. Large samples

The large sample size, as well as the oversampling of ethnic minorities (and Northern Ireland) support subgroup analysis by ethic group and nation. This is important for understanding multiple dimensions of inequality, and for exploring behavioural differences across ethnicities and regions. For example, in a contribution to the IFS Deaton Review on Inequalities, Nandi and Platt (2023) investigate the intersection of immigrant and ethnic inequalities in wages by gender. They find very different ranking of ethnic groups' median individual income for men and women. In another study on ethnicity, the conventional economic wisdom that culture has no impact on saving rates is challenged by investigating three generations of immigrants to the UK.[53] Results indicate a strong and persistent link between cultural preferences and saving behaviour.

5.6. National comparability

To facilitate opportunities for comparative and/or combined research, Understanding Society data are contributed to a number of collaborative platforms in the UK and internationally. For example, Understanding Society is a founding member of the Cohorts and Longitdinal Studies Enhancement Resource (CLOSER),[54] which shares learning and creates guides and harmonised data across longitudinal studies. Understanding Society is also part of the UK Longitudinal Linkage Collaboration (UK LLC), which is a Trusted Research Environment for longitudinal research based on linked NHS data.[55] The UK LLC is creating harmonised domain-specific variable sets across studies to facilitate combined analyses of linked survey and NHS administrative records. For example, Green et al. (2023) used seven longitudinal studies available on the platform – Understanding Society, the five British birth cohorts and the English Longitudinal Study of Ageing – to investigate the impact of the disruption to health care during the pandemic, finding that it led to an increase in avoidable hospital admissions.

[53] Costa-Font, Giuliano and Ozcan, 2018.
[54] See https://closer.ac.uk.
[55] See http://ukllc.ac.uk.

Author Manuscript

5.7. International comparability

Finally, Understanding Society is one of an international family of sibling studies. These include:

- for the US, the Panel Study of Income Dynamics (PSID);[56]
- the German Socio-Economic Panel (SOEP);[57]
- Household, Income and Labour Dynamics in Australia (HILDA);[58]
- the Swiss Household Panel (SHP);[59]
- the Russian Longitudinal Monitoring Survey;[60]
- the Korean Labor & Income Panel Study;[61]
- the China Family Panel Studies (CFPS);[62]
- the Japan Household Panel Survey (JHPS);[63]
- the South African National Income Dynamics Study (NIDS)[64] – no longer operational;
- the Canadian Longitudinal and International Study of Adults (LISA).[65]

The countries covered by these sibling panels face many common challenges (such as ageing, migration, the pandemic and rapid technological change). Opportunities for research arise from cross-country variation in institutions, pre-existing inequalities, in the extent and timing of these common challenges, and in policy responses to them. To facilitate cross-country comparative analyses, Understanding Society data have been harmonised with other household panel studies internationally. The Cross-National Equivalent File[66] and the Comparative Panel File[67] have harmonised complementary domains of data for researchers planning international comparative research.

For example, Chan, Ermisch and Gruijters (2019) conducted an analysis of income mobility in China, Germany, the UK and the US. They found that China exhibits a higher level

[56] See Brown, Duncan and Stafford (1995), McGonagle et al. (2012) and Johnson et al. (2018).
[57] See Goebel et al. (2019).
[58] Wooden and Watson, 2002; Watson and Wooden, 2020.
[59] See Tillmann et al. (2016, 2021).
[60] See Kozyreva and Sabirianova (2015).
[61] See 'An Overview of the KLIPS Korean Labor & Income Panel Study', Microsoft PowerPoint - KLIPS Overview(Eng ver)(1-22nd), https://www.kli.re.kr/klips_eng/file/KLIPS_Overview(Eng_ver)(1-22nd).pdf.
[62] Xie and Hu, 2013.
[63] Akabayashi, Shikishima and Nozaki, 2013.
[64] Woolard, Leibbrandt and de Villiers, 2010.
[65] Michaud and Heisz, 2012.
[66] Frick et al., 2007.
[67] Turek, Kalmijn and Leopold, 2021.

of income inequality compared with the US, which, in turn, is more unequal than the UK and Germany. The factors influencing income levels were also explored, with education identified as a consistent predictor across all countries. However, the paper highlights variations in the relevance of other factors. In the Western countries, variables such as employment status, earners-to-household-size ratio and marital status play a significant role in explaining income differences among individuals. In contrast, in China, factors such as the urban–rural divide, regional disparities and long-standing institutions have a more substantial impact on shaping income inequality. Similarly, using CNEF-harmonised data across multiple countries, Schröder (2020) examined the relationship between working hours and life satisfaction. They found that longer working hours were associated with increased life satisfaction, particularly for men. These gender-based differences were more pronounced in countries with traditional gender attitudes.

6. Data access and support

Understanding Society data are freely available to researchers at the UK Data Service (UKDS) (specific DOI links can be found in Table 1). Three levels of access to UKHLS data are available. Safeguarded data are 'effectively anonymised data' and are shared at two levels: (1) End User License files, which includes most UKHLS data, can be downloaded once registered with the UKDS; (2) Special Licence files, which include more detailed versions of a range of basic variables – such as income, occupation, month of birth, health conditions and medications and multiple geographic identifiers, which can be linked to a wide range of external sources of area level data such as air pollution, unemployment rates, etc. Special Licence files require an application to the UKDS justifying the request for the specific data required; once approved, they can be downloaded but have additional conditions placed on their use. Finally, some data that are particularly sensitive or disclosive are controlled data and can only be used in the UKDS Secure lab. These include the latitude and longitude of the postcode centroid of participant addresses as well as most linked administrative datasets. Access to the data in the Secure lab requires users to undergo specific training (either with ONS or UKDS) and to apply for data. Data are available via remote login at the Secure lab, and outputs are checked before they can be taken out of the lab.

Author Manuscript

The study team provide rich metadata and resources on the study website,[68] together with information on training courses and user support services.

7. Cite your data

It is crucial to the viability of the study that researchers who use it in their research cite the data by including the appropriate bibliographic reference (listed in Table 1) in their reference list. Citation searches are one of the primary ways that funders measure use and so assess the value of the study in terms of the research being produced. It is also beneficial to the researcher. The study team regularly searches for research citing the data and includes it on the website and in materials about the study, which are shared with participants (to encourage them to continue taking part) and with policymakers through summaries in briefings, invitations to knowledge exchange events, etc. When you cite the data, the study team can help maximise the impact of your work.

Table 1 Appropriate data citations

Understanding Society (including the BHPS)	University of Essex, Institute for Social and Economic Research (2022). *Understanding Society*: Waves 1–12, 2009–2021 and Harmonised BHPS: Waves 1–18, 1991–2009. [data collection]. 17th Edition. UK Data Service. SN: 6614, http://doi.org/10.5255/UKDA-SN-6614-18.
Innovation Panel	University of Essex, Institute for Social and Economic Research (2023). *Understanding Society*: Innovation Panel, Waves 1–15, 2008–2022. [data collection]. 12th Edition. UK Data Service. SN: 6849, http://doi.org/10.5255/UKDA-SN-6849-15.
COVID-19 study	University of Essex, Institute for Social and Economic Research (2021). *Understanding Society*: COVID-19 Study, 2020–2021. [data collection]. 11th Edition. UK Data Service. SN: 8644, http://doi.org/10.5255/UKDA-SN-8644-11.
Biomarker data	University of Essex. Institute for Social and Economic Research and National Centre for Social Research (2022). *Understanding*

[68] See https://www.understandingsociety.ac.uk/.

	Society: Waves 2 and 3 Nurse Health Assessment, 2010–2012 [data collection]. 5th Edition. UK Data Service. SN:7251. http://doi.org/10.5255/UKDA-SN-7251-5.

8. Conclusion

In October 2023, the Economic and Social Research Council (ESRC) announced further funding for six waves of both the Understanding Society main survey and the Innovation Panel, together with a further ethnic boost sample and biomarker wave. These data will cover the 2020s, enabling researchers to investigate the long-term consequences of the pandemic, in terms of not just health, but also child development, education and well-being. These will add significantly to the time-span of the Understanding Society panel. With over 20 years of data on key consistent measures for the original Understanding Society sample and 40 years for those in the BHPS, it will be possible to investigate life-course trajectories and intergenerational relationships at the same time as continuing to enable researchers to investigate annual changes in people's lives.

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