

Recruitment and Presence of Population Subgroups over the Life Course: Maintaining Representativeness in Longitudinal Studies

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Recruitment and Presence of Population Subgroups over the Life Course: Maintaining Representativeness in Longitudinal Studies

Outline

1. Representativeness vs. Generalisability
2. Minimising Attrition
3. Balancing Attrition
4. Adjusting for Attrition
5. Adjusting for Mortality
6. Outlook

1. Representativeness vs. Generalisability

Recent debates about need for (population) representativeness vs. need for heterogeneity:

International Journal of Epidemiology (volume 42, 2013);

Longitudinal and Life Course Studies (volume 6, 2015);

Survey Research Methods (forthcoming, based on papers presented at a conference in Paris in March 2017);

National Institute of Statistical Sciences workshop, Washington DC, September 2017;

Public Opinion Quarterly (vol. 81:S1, 2017) special issue on the future of surveys

Assumptions that will be made in this presentation:

- We want the sample to represent a population (somehow defined);
- We want probability sampling, but will need informative analysis of non-response (to provide a basis for design-based, model-assisted inference)

2. Attrition in Longitudinal Studies

Two aspects are *both* important in longitudinal studies:

- The *level* of attrition (proportion of sample 'lost');
- The *nature* of attrition (differential; unbalanced).

Importance of level of attrition:

- Affects variance (precision of estimates), but hard to predict levels decades ahead and thereby determine initial sample size;
- Cannot replace/top-up sample (at least, not with comparable data);
- Sunk costs of participation prior to drop-out (minimising attrition tends to maximise value/cost ratio)

Survey Design Features

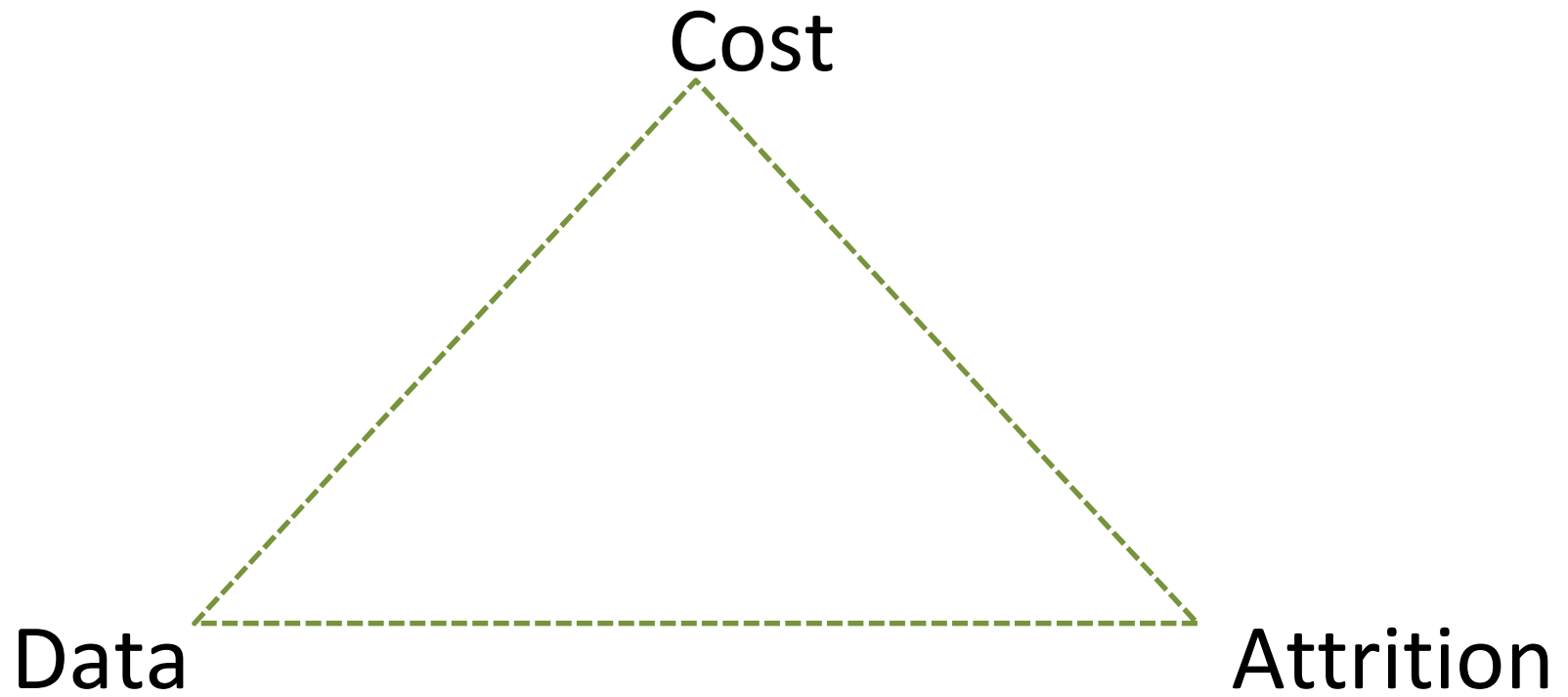
Features likely to influence attritions rates/levels:

- Age at first observation / period of observation
- Frequency of observation
- Nature / burden / intrusiveness of observation
- Unit of observation / data collection (person, household, family)

Features specifically designed to minimise attrition:

- Motivational communications (letters, emails, leaflets, etc)
- Endorsement /sponsorship
- Respondent incentives (monetary, gifts, lottery, etc)
- Extended fieldwork efforts
- Tracking / tracing procedures
- Etc, etc

Survey Design Features: Trade-Offs



Reasons for Attrition I

Reasons for non-response that would apply on any survey. Repeats of one or more of:

- Failure of the data collector to locate/identify the sample element;
- Failure to make contact with the sample element;
- Refusal of the sample element to participate;
- Inability of the sample element to participate (e.g. ill health, absence, etc);
- Inability of the data collector and sample element to communicate (e.g. language barriers);
- Accidental loss of the data/ questionnaire.

Reasons for Attrition II

Additional causes of wave nonresponse that apply only in longitudinal studies:

Tracking between waves → location

If the study population is mobile or relevant contact details are liable to change (e.g. email addresses, for a web survey, or phone numbers for a phone survey), it may be worth investing resources in tracking.

Experience of participation → co-operation

From wave 2 onwards, the sample member has experience of taking part. They 'know' how long it takes, how difficult it is, how interesting (or otherwise) it is, how intrusive the questions are, etc. This is likely to be a major influence on willingness to take part again. Leave sample members with a positive experience of taking part!

Age of First Observation

Aging studies often start around age 50 (e.g. HRS, ELSA, SHARE, ...)

Birth cohort studies start at age 0 (e.g. NCDS, BCS70, MCS, ...)

Some other cohort studies start at school, or on leaving school (e.g. YCS, Next Steps)

Household panel studies (inter-generational studies) start pre-birth

All these options and more are possible

Starting younger provides more data (and hence more research opportunities), but typically costs more (in the long run) and results in higher attrition (at any given older age)

Frequency of Observation

Long-term longitudinal surveys vary in their (typical) between-wave interval, e.g.

- 1-year (most household panel surveys),
- 2-year (PSID),
- 4-year (BCS70, MCS).

Varying intervals are possible, with observation being more intensive during the periods or life stages of most research interest.

e.g. one option (of many) for a study designed specifically to study aging would be to collect only key background data at key stages early in life, and then much more frequently from age 50 on (for example, every 5 years from 0 to 20, then every 10 years until 50, then every 2 years)

Dropout due to Attrition

Typically, longitudinal studies have a definition of dropout, e.g. no data successfully collected for 3 consecutive waves or explicit (adamant) refusal to continue participating.

Once the definition is met, no further data collection attempts are made.

One option to consider for an aging study starting at birth is to treat the 'early-years' and 'aging' data collection phases as separate studies

e.g. at age 50, attempt to collect data for all recruited members of the early-years study, regardless of attrition history in that study

Example: Aberdeen IQ and mortality study successfully traced 80% of cohort after 65 years (1932 aged 11 – 1997 aged 76) based on family name, first name, date of birth, school attended in 1932 (39% died, 41% alive).

Tracking / Tracing (Locating Sample members)

Influences on Propensity to Locate (general):

- Quality of contact information (currency of available information, typically from sampling frame; breadth of information)
- Persistence/resources in case of poor quality/ out-of-date information

Influences on Propensity to Locate (specific to longitudinal studies, post recruitment):

- Geographical mobility
- Other changes to contact details (phone numbers, email addresses)
- Interaction between rate of mobility/change and interval between waves determines the size of the location task

Maximising Propensity to Locate (Standard strategies)

Collect contact details upon recruitment and at each wave. Cumulate these details and use them in a structured way at each wave:

- Addresses;
- Email addresses;
- Phone numbers (home, cellphone, office)
- Contact details of friends or relatives ('stable' contact details)

If between-wave interval is large, consider extra "keeping in touch" exercises:

- emailings with link to report changes of details;
- mailings with change-of-address cards;
- birthday (or 'event') cards (especially for birth cohort studies)

Use tracking strategies when contact is lost.

Tracking Strategies

Dependent on resources, available information, data access, local circumstances.

- Field tracking (generally only used on face-to-face surveys): ask neighbours, new residents of previous address, local town hall, etc
- Electronic tracking (databases): electoral registers, health registration, social security, credit agencies, etc
- Phone/mail tracking: can use all recent and previous details, including for related persons

3. Balancing Attrition

Not all panel members are equal:

- Greater value in retaining sample members (with characteristics of those) at highest risk of dropout

Not all effects are equal:

- Studies of effects of design features on nonresponse often find heterogeneous effects across subgroups

Thus, *standardised* design features (identical treatment of all sample members) may be inefficient and ineffective

Targeted methods can be used to optimise resource allocation to minimise differentials in attrition / nonresponse

Targeted Design Features

- A design feature is varied between subgroups of sample members
- It is possible to vary more than one feature simultaneously
- Aim is to beneficially affect the relationship between survey costs and survey errors
- Variation(s) in design feature(s) are identified and planned in advance of each wave of data collection
- No adaptations are made during field work (static design)
- Requires advance knowledge of relevant subgroup membership (unproblematic for longitudinal surveys) and knowledge of heterogeneity of effects of potential treatments

Treatments

With the aim to reduce nonresponse error (differential attrition), treatments (design variations) can include:

- Differential incentives, monetary or otherwise;
- Differential field time (i.e. prioritising certain types of cases) or call scheduling;
- Differential modes / mode combinations / mode prioritisation
- Differential methods to encourage keeping in touch / notifying changes of address/phone/email;
- Differential communications (advance letters, information brochures, between-wave mailings, etc).

4. Adjusting for Attrition

Range of methods available;

Post-stratification rarely possible for longitudinal populations

Common strategies involve design weighting, post-stratification of recruitment sample, and sample-based non-response weighting for attrition

Various modelling approaches, used either alone or in combination with weighting, including MI

Multiple populations, and respective responding samples ($2^t - 1$ after t waves, e.g. 1,023 populations if $t=10$)

Common Issues

Selection of auxiliary (survey) variables

Identification of eligibility (primarily mortality and emigration) at every wave for every sample element

5. Adjusting for Mortality

Longitudinal studies typically attempt to identify mortality at each wave of data collection. Some also link to death registrations routinely.

But some degree of under-identification is inevitable. Extent tends to accelerate over time, because:

- Higher numbers of dropouts per wave in early waves;
- Lower chance of identification of death if it occurs long after dropout.

In the presence of under-identification of mortality, any attrition adjustment method will tend to result in estimates biased towards the characteristics of sample members who are more likely to have died (because such members will incorrectly be assumed eligible)

Case Study

British Household Panel Study: Estimated Retention Rates

	Age in 1991	BHPS Wave 1 (1991)	BHPS Wave 7 (1997)	BHPS Wave 13 (2003)	Understanding Society Wave 2 (2010)	Understanding Society Wave 7 (2015)
Panel 1 (unadj)	16-19	696	71.6	58.7	41.8	30.4
	20-29	1,960	74.0	64.4	45.5	34.7
	30-39	1,972	78.8	69.2	49.1	37.9
	40-49	1,877	78.9	69.5	51.4	41.6
	50-59	1,298	76.6	68.6	51.4	37.5
	60-69	1,213	79.8	71.7	43.4	20.6
	70+	1,248	71.7	50.1	17.3	6.5
Panel 2 (adj)	16-19	696	71.7	58.9	42.0	30.8
	20-29	1,960	74.1	64.6	45.8	35.3
	30-39	1,972	79.0	69.6	49.9	39.1
	40-49	1,877	79.2	70.1	53.2	44.8
	50-59	1,298	76.7	70.8	57.5	47.0
	60-69	1,213	81.0	79.1	57.2	41.0
	70+	1,248	78.9	71.6	38.6	30.4

Panel 1: 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. Known deaths have been removed from the denominator for waves subsequent to death, but deaths are under-identified, 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. Panel 2: Expected mortality rates estimated from ONS data for each age/gender group and assumed to apply to sample.

6. Outlook

High retention rates over a lifetime, and

Minimal estimation bias due to attrition,

will require:

- Very low under-identification of mortality (and emigration)
- Highly effective tracking methods
- High survey participation rates, especially at key ages
- Improved weighting and adjustment methods?

(routine, high-quality linkage to admin data might help: cf. ESRC longitudinal studies review recommendation for an admin data spine)

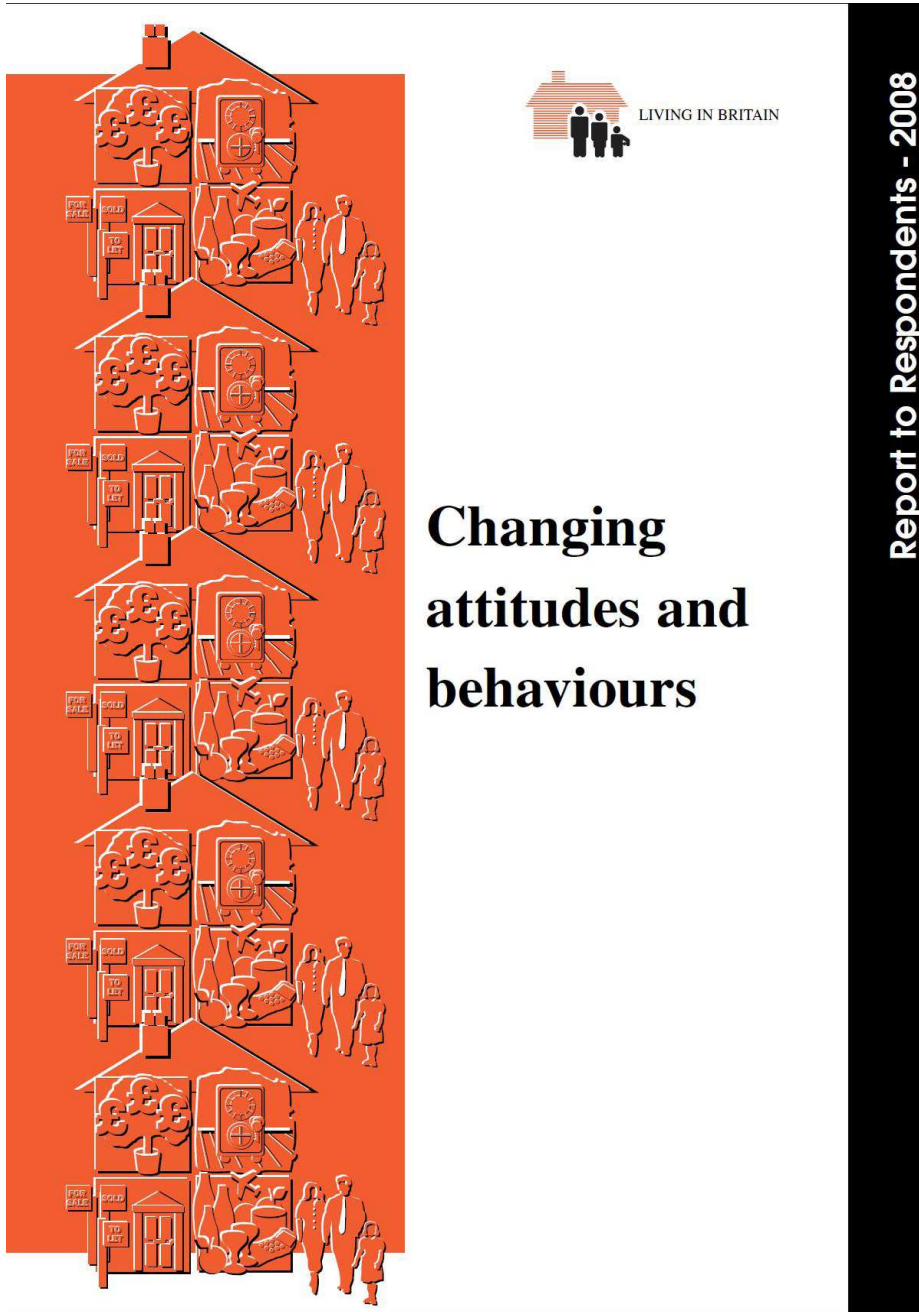
Appendix

Experiments with Targeted Between-Wave Mailings

Fumagalli et al (2010) experimented on BHPS, between waves 17 and 18, with:

- Standard study report to all sample members
- vs. Tailored report (“young people” and “busy people” versions)
- Mailings otherwise identical

Standard Report

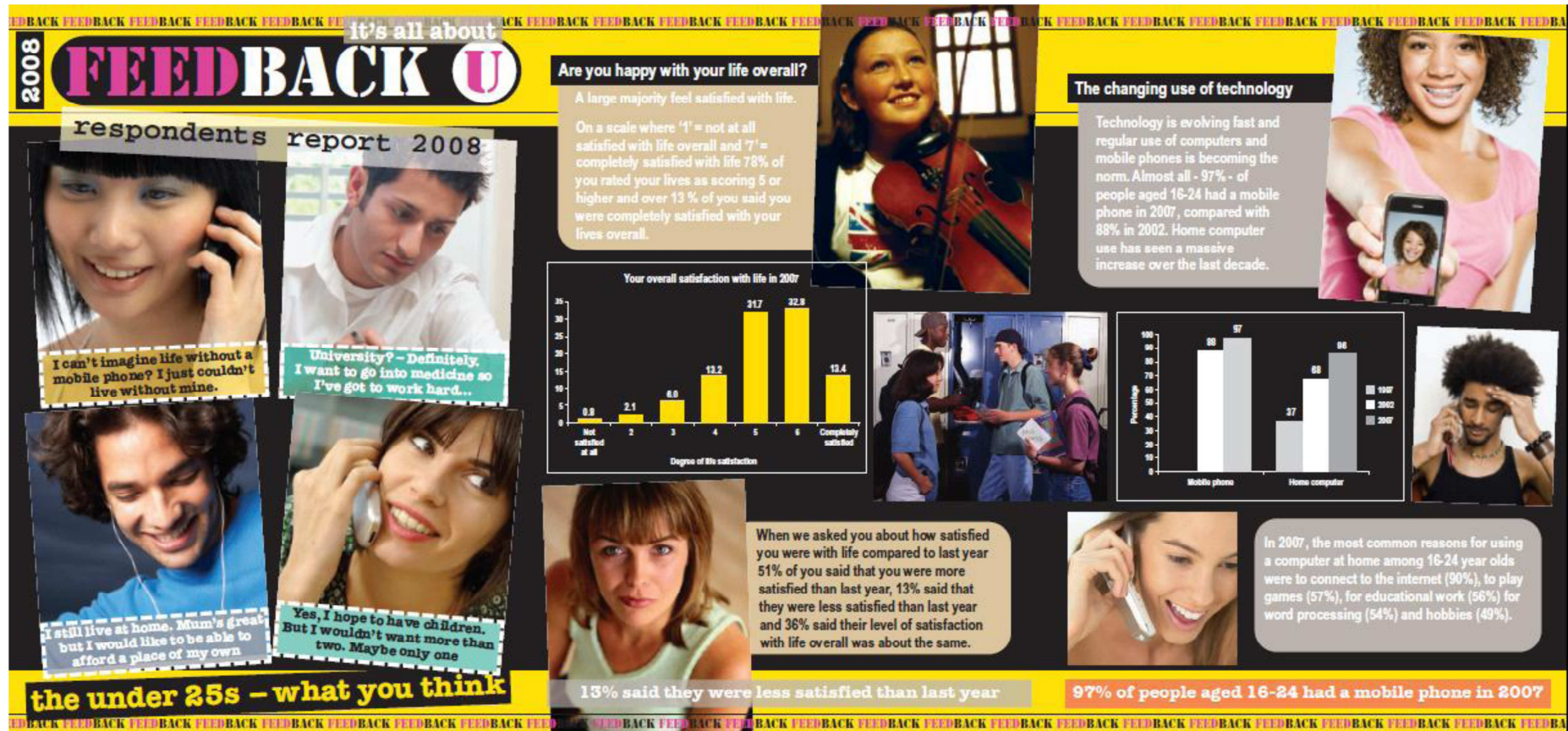


LIVING IN BRITAIN

Changing attitudes and behaviours

Report to Respondents - 2008

Tailored Report (Young People)



Tailored Report (Busy People)

respondent report 2008

BURNING THE CANDLE

STRESS AT WORK



- 13% of work-pressured people say they worry about job problems or find it difficult to unwind at the end of the day most or all of the time. And 50% say they do this sometimes.
- Around 6 in 10 sometimes feel exhausted or 'used up' after work, with another 2 in 10 saying they feel this way most or all of the time
- Those who are self-employed or employees who work long hours are more likely to feel stress with work than those who work shorter hours

Work is draining: 60% are 'used-up' after work

respondent report 2008

Financially optimistic...

Busy people tend to be optimistic when it comes to their own future prospects. More than three-quarters said that they were living comfortably or doing alright. Over 1 in 3 (35%) said that in one year's time they expected to be doing better than now. Busy people were also more likely to own shares, ISAs and other investments.



... but over-stretched?

Busy people were more likely to have debts, other than mortgages. Almost half had some sort of debt, compared to just 4 in 10 of other adults. People who work longer hours were more likely than others to have personal loans, credit card debts, hire purchase agreements and an overdraft, but were less likely to owe money to catalogues or other mail order companies. The average amount of money owed by the job-busy who had debts was around £10,250, compared to £8,000 for other adults. However, job-busy people are likely to be able to afford to service their debts. If we split monthly earnings into five equal groups, the job-busy are over 2 times as likely to be in the highest earning group than other workers.

Thank-you for taking part

Many thanks for giving up some of your time to help us with the survey. Your help is vital to ensure that all types of people and experiences are represented in the survey – including those who live busy lives and have work and family commitments to juggle. Remember, if you need to contact us for any reason please call our Freephone number 0800 252853

The Job-busy earn 40% more than average workers

respondent report 2008

BURNING THE CANDLE

THE JOB BUSY



ARE YOU WORK-PRESSED?

25% of workers spend about 43 hours a week at work

Outcomes: Young People

	Targeted (%)	Standard (%)
Full face-to-face interview	93.2	91.6*
Full face-to-face interview <i>or</i> shorter phone interview	94.1	94.2
No interview	5.9	5.8
n	843	856

Outcomes: Busy People

	Targeted (%)	Standard (%)
Full face-to-face interview	90.3	90.1
Full face-to-face interview <i>or</i> shorter phone interview	97.5	96.5*
No interview	2.5	3.5*
n	1205	1157

Experiment with Targeted Advance Letters

Lynn (2016) experimented on Understanding Society Innovation Panel, wave 6:

Randomly allocated to two groups:

- Standard letter (same for all sample members);
- Targeted letter (wording varies between subgroups)

Orthogonal experimental treatments:

- Mode: CAPI single-mode vs. Web-CAPI seq. mixed mode;
- Time in sample: 6th wave vs. 3rd wave

Targeted Subgroups

Group	Definition	Frequency	Percentage
Employment-busy	Employed for at least 39 hours/week, or employed 30 to 38 hours with a commute of least 60 minutes	425	15.6
With children	Responsible for at least one child under 15 in the same household	339	12.4
Young	Aged 16 to 29 at the time of wave 5	323	11.8
London	Resident in London or south east England	358	13.1
Pensionable	Of pensionable age at the time of wave 5 (60 or over for women; 65 or over for men)	464	17.0
Remainder	None of the above	824	30.1

Variants of the Initial Letter

First paragraph: Thank you so much for helping with the *Understanding Society* survey last year. The survey helps researchers and policy makers understand the changes in the needs of the country across diverse subjects like <text> – and because your information was so valuable, we'd like to hear from you again.

Letter version	<text>
Employment-busy	your work-life balance, your position in your employment and your retirement
With children	the provision of child care, schooling and education
Young	the impact of the economic climate on employment prospects and the influence of mobile technology on life
London	the cost of living and the provision of schools, housing and public transport
Pensionable	the provision of social care and the cost of energy and fuel



<resp_name>
 <FF_Address1_fin>
 <FF_Address2_fin>
 <FF_Address3_fin>
 <FF_Address4_fin>
 <FF_Address5_fin>
 <FF_PostCode_fin>

<Date>

We can't do without you, <Salutation>.

Thank you so much for helping with the Understanding Society survey last year. The survey helps researchers and policy makers understand the changes in the needs of the country across diverse subjects like your work-life balance, your position on your employment and your retirement – and because your information was so valuable, we'd like to hear from you again.

The survey is available online at the website shown below, so you can complete it at a time that's best for you. (Please use a computer, rather than a mobile device.)

<https://www.understandingsociety.ac.uk/Survey>

When you've reached the website, you'll be asked to enter your unique access code.

Your unique access code is: <UserID>

<If you can't complete the survey online by <Deadline>, an interviewer will visit you to conduct the survey.>

<One area of particular interest this year is fuel consumption and we would like to collect readings from your gas and electricity meters. And if you have a car, we would like to know the mileage. It may help to have these handy before the interviewer calls. Of course, you don't have to tell us this, if you don't want to.>

We rely very much on the contributions you make. So to thank you for your help, I've enclosed a <IncentiveGrp> voucher, which you can cash today at any Post Office. <And, if all members of your household complete the survey online by <Deadline> we will send each of you an additional £20 voucher.>

Your participation is entirely voluntary, but we do hope you'll be able to help. By taking part, your voice is heard. If you have any questions, please call us on 0808 168 1356 or contact us at help.understandingsociety@natcen.ac.uk

Many thanks,

Professor Nick Buck
 Director, Understanding Society
 Institute for Social and Economic Research
 University of Essex

This study is being conducted in accordance with the Data Protection Act. This means your personal details will be kept strictly confidential and you and your household will not be identifiable from the data.

<Serial_number><ChkL>/<FF_PID>

- We need your help**
- Have your say online**
- Enter your code**
- Complete the survey**
- Here's <IncentiveGrp>**
- Find out more**

<Letter5

Results: Response Rate

Sample subgroup	<i>n</i>	Response Rate		<i>P</i>
		Standard %	Targeted %	
Full sample	2,733	72.0	73.8	0.28
Previous wave respondents (RESP)	1,979	87.4	85.9	0.34
Previous wave non-respondents (NRESP)	754	32.4	41.4	0.01**
Time in sample: 6 waves (TIME6)	1,853	72.5	71.6	0.64
Time in sample: 3 waves (TIME3)	880	70.9	78.8	0.007**
Single-mode CAPI (CAPI)	946	71.4	71.1	0.92
Mixed mode web-CAPI (MMODE)	1,787	72.3	75.3	0.16
NRESP * CAPI	248	27.5	29.9	0.67
NRESP * MMODE	506	35.0	46.5	0.008**
TIME3 * CAPI	325	64.9	78.8	0.005**
TIME3 * MMODE	555	74.4	78.9	0.21

Targeted Advance Letters – Summary

- A targeted initial letter **can** increase response rates
- (Also, some evidence that it may reduce response times)
- Effects are uneven across survey design contexts and sample subgroups;
- Important difference: advance letter is a **prenotification** letter in CAPI mode, but an **invitation** letter in mixed mode:
 - CAPI: no immediate action that sample member can take;
 - Mixed mode: sample member can immediately fill survey
- Positive effects on response rate are only observed for low-propensity subgroups, so sample composition may be improved

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