



June 2022

Active Lives survey

2020-2021

Year 6 Technical Report



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1 Introduction

1.1 Survey background

Sport England is an increasingly insight led organisation that is tasked with the behavioural challenge of getting more people active. To create the right conditions to increase participation, to decide who we invest in, and to understand how sport can deliver wider objectives we need both a broad and deep understanding of sports participation.

Through our commitment to the measurement of sports participation over the past decade we have largely unparalleled participation data both internationally and amongst other sporting and cultural organisations in the UK. Through the Active Lives Adult Survey, we have sought to strengthen this commitment whilst ensuring our data reflects the best available methods of data collection and aligns with our new strategy (Uniting the Movement). To achieve this we piloted new methods, consulted widely with the sector, and sought advice from independent experts such as the Office of National Statistics and the Institute for Social and Economic Research in the development process.

1.2 Summary of the survey

In this section, we provide a brief overview of the key points in relation to the survey design, fieldwork and data. Full details are provided in the rest of the report.

The fifth year of the Active Lives adult survey was conducted by Ipsos on behalf of Sport England, which commissioned the survey with additional funding from the Office for Health Improvement and Disparities (OHID) and the Arts Council England.

1.2.1 Design

The Active Lives adult survey is a 'push-to-web' survey involving four postal mail outs designed to encourage participants to complete the survey online. The survey is fully 'device-agnostic' and so can be completed on mobile devices or a desktop PC/laptop. The first two mail-outs are letters containing information about how to access the survey online and a passcode for accessing the survey. At the third mailing a paper self-completion questionnaire is sent out to maximise response. A final letter reminder is sent at the fourth mailing which includes a reminder of how to access the online questionnaire (it does not include a paper questionnaire).

The data were collected between 16th November 2020 and 15th November 2021 using an online questionnaire and a paper self-completion questionnaire. Up to two adults (aged 16+) from each selected household were invited to complete the survey, either online or using the paper questionnaires. Valid responses were received from 177,273 people in total.

1.2.2 Questionnaire

The questions within the Active Lives survey questionnaire explore the sport and physical activities that people take part in, how often they participate, for how long and where they take part. Questions on attendance at live sporting events, membership of clubs, levels of volunteering, motivations, loneliness, readiness for physical activity and participation habits are also included. Finally, the questionnaire also includes classification questions such as age, gender, socio-economic status, education level, household living arrangements, sexual identity and religion. It should be noted that some of the questions were asked to half of the sample online. This was to allow for different questions to be asked of different

groups without increasing the length of the questionnaire. Later in this report we show which questions were asked of each group.

1.2.3 Sampling

The sample is selected from the Postcode Address File using random probability sampling and one letter is sent to each address inviting up to two adults from the household to take part. If households do not respond to the initial invitation letter, up to three reminder letters are sent to help maximise response to the survey. In total, during the sixth year of the survey, initial invitation letters were sent to 564,614 addresses in England.

1.2.4 Weighting

Weighting is calculated that make the achieved sample match the population as closely as possible with the aim of reducing bias in the survey estimates. The weighting corrects for the disproportionate selection of addresses across local authorities (related to target samples for each local authority) and for the selection of adults within households, and then the sample is adjusted to control for seasonality (by month) and to match a combination of population estimates and national estimates from the Annual Population Survey (2020). Some questions are only asked within the online survey, and others are asked of a sub-sample of online respondents (respondents to the online survey are randomly assigned to two sub-groups). Additional weights are created for questions within these sections. For more information on the weighting strategy, see the Weighting section, later in this document.

1.3 Signposting for the technical report

This report is organised broadly in the order in which survey processes were completed: questionnaire design, sampling, fieldwork, response, weighting, data management. A final section describes some experiments which were conducted during the sixth year of the survey.

1.4 Terminology used in the report

Those who respond to the survey are referred to as respondents. The reason for not using the conventional term participants is that, in the context of sports participation, participant has a different meaning. When describing the development of the questionnaire using focus groups and cognitive interviews, those who took part are referred to as participants, since respondent is not a suitable term to use in the context of qualitative methods.

2 Questionnaire development

2.1 Overview

The Active Lives adult survey started in November 2015 – at that point, extensive testing was undertaken to ensure that the proposed questions could be easily understood by participants, and that it was sufficiently consistent across survey modes. The Technical Report produced to accompany the first year of the Active Lives survey data provides extensive information about the development of the original survey questionnaire.

2.2 Questionnaire contents

The Government's Sporting Future Strategy includes some Key Performance Indicators (KPIs) in relation to participation in sports and physical activity. The Active Lives survey is designed to provide data to measure progress towards those indicators. The table below shows the KPIs which data has been collected for.

KPIs built into the questionnaire design

KPI	Summary definition	Precise definition
1a ¹	KPI 1a – The percentage of the adult population undertaking at least 150 minutes of moderate physical activity a week	Physically active with at least 150 minutes per week of moderate intensity activity in bouts of 10 minutes or more spread over several days. Periods of vigorous activity are counted as double.
2a	KPI 2a – The percentage of adults physically inactive	Physically inactive with less than 30 minutes per week of moderate intensity activity in bouts of 10 minutes or more spread over several days. Periods of vigorous activity are counted as double.
3a	KPI 3a - The percentage of the adult population taking part in sport and physical activity at least twice in the last 28 days	Participate in at least two sessions of at least moderate intensity activity in the last 28 days combining to at least 60 minutes in total over the 28 days.
10a	KPI 10a – The demographics of adult volunteers in sport compared to society as a whole	
11a	KPI 11a – The percentage of adults who have attended a live sporting event at least twice in the past year	Attended a live sporting event at least twice in the past year to include watching professional and amateur sport.

In addition, Sport England has a responsibility to collect data on participation in specific sports and disciplines, not just overall participation in activity.

¹ KPI 1a and KPI 2a are also treated as measures of the physical wellbeing outcome in the strategy (outcome one).

To produce data for these measures, the questionnaire needed to ask questions to capture information on:

- which activities people take part in,
- how often they take part,
- how long they take part for each time, and
- the intensity of the activity.

Key demographic information was needed, such as age, sex, ethnicity, disability, socio-economic status, education level. The survey was also being used to gather data on other health measures including obesity and fruit and vegetable consumption for the Office for Health Improvement and Disparities (OHID), and information on participation in some key arts and cultural activities for Arts Council England.

During the original design phase at Year 1, questions from other surveys including the previous Active People survey, the Health Survey for England and IPAQ (International Physical Activity Questionnaires) were considered. Active Lives was a new survey with a different methodology and intended to measure different outcomes from those in the Active People survey. Nonetheless, it was important that data could be reproduced on some of the key measures (e.g. overall participation, participation in swimming, running, football and other key activities).

A draft questionnaire was produced through collaboration between Ipsos and Sport England with Sport England focussing on the requirements in terms of their data needs and Ipsos focussing on questionnaire design issues.

2.2.1 Design of questions

The strategy document “Sporting Future: A New Strategy for an Active Nation” was published by the Department for Media, Culture and Sport in December 2015, (after Year 1 fieldwork had started) and included some KPIs which required data not included from the start of the survey. The following KPI requires data from the Active Lives adult survey to monitor progress and so, additional questions were added about volunteering alongside some additional classification questions (religion, sexual identity and household living arrangements).

- KPI 10a – The demographics of adult volunteers in sport compared to society as a whole

In addition, Sport England needed information on the settings in which people take part in activities, particularly outdoor settings as participating in sport and activity in the natural environment is a key element of Sporting Future.

There was a desire for questions on membership of clubs, attitudes to sport and activity, the extent to which people have physical activity as a habit and readiness to participate (for those who are less active). New questions were added after Year 1 fieldwork had started to collect data on the strategy outcomes which include ONS wellbeing, individual development and community trust.

Wellbeing outcomes

Outcome	Summary definition	Reported by
2	Mental Wellbeing	Mean score out of 10 for subjective wellbeing as measured by the ONS wellbeing questions
3	Individual development	Mean score out of 5 for their perception of their ability to achieve goals and to keep trying when finding something difficult
4	Social/community development	Mean score out of 5 for trusting others in the local area and mean score out of 4 for agreeing people in their local area get on well together

Sport England also commissioned SIRC (Social Issues Research Centre) to conduct a review of volunteering and club membership literature and existing questions. Alongside the SIRC review, focus groups were carried out to understand how people describe their motivations and habits in relation to sports and physical activity to ensure that the resulting questions correspond to the way in which people think about these issues.

2.3 Survey mode and questionnaire design

The survey was offered both online and as a paper version which could be returned by post. The first two invitation letters provided the link/unique passwords to the online survey and a paper questionnaire was offered at mailing 3 (alongside a repeat of the online log in details). Mailing 4 provided a final reminder with details of the online log in details included again. Although the paper questionnaire was only sent unprompted at Mailing 3, participants could request a paper questionnaire after any of the mailings. In the final Year 6 dataset, 69.5% of the completed surveys were online and 30.5% were on paper.

The paper questionnaire is 16 pages long with 41 questions and involves some simplification of the online version. For example, it is not possible to offer the complete list of activities which can be shown online. This is because for the online questionnaire, activities are grouped into categories and respondents can click to see a drop down of the activities within each group. This allows a larger number of activities to be presented than on the paper questionnaire.

In addition, more complex questions (such as those asking which settings activities take place in) are not included on the paper questionnaire, since on the online version only the settings tailored to each activity are shown and this sophistication is not possible on the paper questionnaire. The following section shows the survey content for each phase and mode and so highlights where data are not available from the paper questionnaire.

As well as allowing the inclusion of more complex questions and options than the paper questionnaire, the online questionnaire also allows for checking of responses. For example, unexpectedly or implausibly high responses for number of sessions per month or length of session can be checked online, giving the respondent a chance to correct their answer. It is also possible to query logical inconsistencies such as an answer of zero adults in their household and to design questions to prevent people selecting multiple answers on questions where only one answer is required (e.g. gender). On an online survey, it is also possible to prevent people accidentally missing questions. This means that the

data from the online survey can be considered more complete than those from the paper questionnaire. An ongoing challenge for the survey is increasing the percentage of questionnaires completed online.

Efforts to maximise the online response to the survey have been made by offering a device agnostic online questionnaire. This means it can be completed on a desktop or laptop computer, a tablet or a smartphone. For simpler questions the format is the same on any device, but for more complex questions (for example, grids) the presentation is automatically changed according to the device on which it is completed.

The drop-down response lists (for example on activities and ethnic groups) work equally well on all types of device. The in-house testing of the online questionnaire involved testing on a range of devices including laptops, desktop PCs, standard and mini tablets (on devices with android, iOS, and Linux operating systems), and the most popular types of smartphones (including the latest and older models). It also involved thorough testing on the most popular browsers (Internet Explorer, Chrome, Firefox and Safari).

2.4 Overview of survey content by phase and mode

As explained in the previous sections, the survey was conducted in two modes (online and paper). The table below summarises the questions asked and data available from each mode in each phase. In addition, owing to the required questionnaire content being greater than could be included in a single interview, there were two routes through the questionnaire with the sample split into two groups (determined at the moment they entered the questionnaire), each of which took one of the routes through the questionnaire.

Questionnaire content of the adult survey in order of questions

Topic	Online group 1	Online group 2	Paper
Cultural Activities			
Cultural activities in last year	✓	✓	✓
Frequency of cultural activities	✓	✓	✓
Cultural activities in last 4 weeks	✓	✓	✓
Sport and Physical Activities			
Walking, cycling, dance, and gardening in the last year	✓	✓	✓
Sports and activities in the last year	✓	✓	✓
Which period in the last year activities were done in (for all activities reported in last year)	✓	✓	✗
Whether activities done in the last 28 days (for all activities reported in last year)	✓	✓	✓
Number of days/ sessions of activities in the last 28 days (for all activities reported in last 28 days)	✓	✓	✓
<i>Time spent doing activity in each session</i> (for all activities reported in last 28 days)	✓	✓	✓
Intensity of activities done (for all activities reported in last 28 days unless intensity is assumed)	✓	✓	✓

Topic	Online group 1	Online group 2	Paper
Whether activity was enough to make muscles feel tension, shake or feel warm (for all activities reported in last 28 days unless intensity is assumed)	✓	✓	✗
Settings in which the activities are done (for all activities reported in last 28 days unless setting is assumed)	✗	✓	✗
Membership of clubs for each activity (for all activities reported in last year)	✓	✗	✗
Feelings About Sport and Activities			
Agreement to statements about habit about up to two specific activities (see questionnaire for routing rules)	✓	✗	✗
Agreement to statements about readiness for sport/physical activity in terms of ability and opportunity (see questionnaire for routing rules)	✓	✓	✓
Agreement to statements about motivation (see questionnaire for routing rules) ²	✓	✓	✓
Volunteering			
Which of 7 volunteering activities have been done in last 12 months	✓	✓	✗
How often volunteered in last 12 months	✓	✓	✗
Whether volunteered/How often volunteered in last 4 weeks	✓	✓	✗
How long a usual session of volunteering is	✓	✓	✗
How many years been volunteering	✓	✓	✗
Diet			
Fruit and vegetable consumption ³	✓	✓	✓
Demographics			
Gender	✓	✓	✓
Sexual identity	✓	✗	✗
Age	✓	✓	✓
Number of adults in household	✓	✓	✓
Number of children in household	✓	✓	✓
Age of children in household	✓	✓	✓
Presence of 16-24-year-olds in household	✓	✓	✗
Household living arrangements (Relationship to people in household and whether children have left home)	✓	✓	✓

² The statement 'I feel that doing sport is pointless' was only asked in the online survey

³ Prior to Y6 Fruit and vegetable consumption was asked as two separate questions. At Y6 these were combined into a single question.

Topic	Online group 1	Online group 2	Paper
Ethnicity	✓	✓	✓
Religion	✓	✗	✗
Health and Disability			
Height and weight	✓	✓	✓
Disability (conditions lasting 12 months or more, whether limiting, and area which disability affects)	✓	✓	✓
Wellbeing questions (ONS)	✗	✓	✗
Loneliness (ONS)	✓	✓	✓
Self-efficacy (goals and effort)	✗	✓	✗
Community Trust	✗	✓	✗
Socio-Economic Status			
Highest educational qualification	✓	✓	✗ ⁴
Working status	✓	✓	✓
Current studies	✓	✓	✗
Socio-economic variables (for NS-SEC classifications) on employment and education	✓	✓	✓

2.5 Specific questionnaire content and design issues

The main section of the questionnaire is designed to gather information on which activities people have taken part in, how much time has been spent doing them and the level of intensity. This information can then be used to create measures which correspond to the KPIs in the Sporting Future Strategy. For this reason, the key reference periods used are the last year and the last 28 days since these are the reference periods in the KPIs.

It should be noted that there are recall errors associated with long reference periods for these types of behaviour. Errors associated with use of a 28-day and a year-long reference period include telescoping (where people bring in activities which actually took place earlier) and omission of activities which took place in the period because they have been forgotten. In gathering detailed activity data for a 28-day period, some respondents will have multiplied what they did in the last week by four, which may have led to errors in the calculation, or in reporting information for the 28-day period which was not strictly correct if not all four weeks were like the most recent week.

In gathering information on participation in activities, respondents were not required to select 'no' for activities they had not done. Given the volume of activities to select from, this would have been an excessive burden on respondents. This means that in analysing activity and deriving the key measures, any activities which have not been ticked are regarded as not having been done. This contrast with other questions, where the absence of a tick is treated as missing data.

⁴ Postal data for highest educational status was excluded from this release due to a data capture error.

An important measure for analysis of the activity data is socio-economic status. The key measure used is NS-SEC (National Statistics Socio-Economic Classification). This is derived from information about people's occupations and their workplace. In other official surveys, this is derived using detailed questions about job description, qualifications needed to do the job, the place where they work as well as information on number of employees and supervisory responsibilities which is then coded to SOC (Standard Occupational Classification) which is in turn used to derive NS-SEC. However, this full approach to the collection of the data used to code SOC and then NS-SEC relies on interviewer administration (in person or by telephone). The Office for National Statistics (ONS) have created a short self-coded version which can be used to create five classes of NS-SEC. This is not as accurate as the interviewer-coded counterpart, with 75% agreement with the full version. ONS ran an experiment in 2001 on their Omnibus comparing interview-coded NS-SEC (the measure collected in the Labour Force Survey) against self-coded NS-SEC (the measure collected in the Active Lives Survey) for the same participants. They found that there was a tendency for people to overstate their NS-SEC level, with a lower proportion coding themselves as semi-routine and routine than in the full version.

Nonetheless, because of the importance of socio-economic differences in participation and the under-representation of some groups in the survey responses, NS-SEC has been used for weighting, even though it is not directly comparable with the NS-SEC version in the Annual Population Survey which provides the targets to which we weight the data. To mitigate the impact of this, highest educational qualification, which is more comparable, between the Active Lives survey and the Annual Population Survey has also been included in the weighting. The weighting is explained in more detail in the weighting chapter.

In the dataset, where follow-up questions have only been asked for a subset of respondents, the data have been used to create derived variables which are re-based to the population. For example, volunteering more than once in the last year, and number of long-term limiting disabilities.

3 Sampling

3.1 Sample design

The sample for the Active Lives survey was selected from the Postcode Address File (PAF) – a list of all postal addresses in the United Kingdom maintained by Royal Mail. There are no other sampling frames that give the coverage and ease of use of the PAF. The PAF is a list of addresses and contains no information about residents at addresses. Hence the need to send the survey materials to the address without names, and to issue instructions about selecting up to two adults within each selected address (see section on household sample design on the next page for further information on this process). Because the samples were un-clustered within each local authority, the sample was selected as a systematic sample with the PAF addresses in postcode order. This was to ensure a good spread of addresses across the local authorities.

The sampling was designed to achieve pre-determined numbers of returns from adults within each local authority across the year of the survey. For the majority of the local authorities (292 from 314) the target number of completed questionnaires was 500 returns.

3.2 Sample size

There was considerable variation in the issued sample size for each wave. This varied to meet the target number of returns nationally (176,950) and at a local authority level. The table outlining the variation in issued sample size can be seen overleaf.

Issued sample size by wave

Wave	Issued sample size
61	49,806
62	48,124
63	47,854
64	41,763
65	43,084
66	42,994
67	40,345
68	40,061
69	40,983
70	50,198
71	61,053
72	58,248

3.3 Household sample design

Addresses are selected on a random basis from the Postcode Address File (PAF) to take part in the Active Lives survey. At each address, up to two adults can take part in the survey. Two unique login codes for the online survey are provided on each invitation, and at the paper questionnaire mailing (M3), up to two questionnaires are sent (if one adult in a household has already completed the questionnaire online, then only the unused password and one questionnaire will be sent in reminders, which follow the initial invitation). Each adult who completes the questionnaire can claim a £5 paper voucher/or online gift code for doing so. This methodological approach was used in preliminary testing by Sport England, prior to commissioning Ipsos to undertake the Active Lives survey.

In the preliminary testing work on this approach carried out by Sport England, four log-in codes were provided in the invitation letter (each with a conditional incentive). While this removed the need for any selection of adults in nearly all households (only 1% of households have more than four adult residents), it has the potential for fraud whereby a household can complete the survey for more adults than actually live there in order to obtain the incentives on offer. The work for Sport England found that 4% of addresses filled in the survey for more adults than they listed as living at the address, and the average size of participating households was higher than would be expected (2.19 compared to an average household size of around 1.41).

Collecting up to two completed questionnaires per household reduces the chance of receiving fraudulent responses. There is still scope for fraud using this approach, but this is reduced. Therefore, for the main Active Lives adult survey, two logins were provided on each letter.

3.3.1 Process for selecting adults within a household

There are no selection criteria to taking part in the survey. Instead, any two members of the household (aged 16+) can take part. Using this approach, it is estimated that 93% of the sample are the ones that would be selected using a quasi-random approach (compared to 57% of the sample if only one adult was selected).

There are many approaches that could be taken to selecting adults within households. For instance, the two adults with the most recent birthdays, or the adults with the two next birthdays, could be selected to complete the questionnaire. These are commonly referred to as quasi-random approaches as they are roughly equivalent to a fully random approach. While this would randomise the selection process to a degree in households where there are more than two adults, in self-administered surveys it just adds another barrier to completing the survey and has shown to not be carried out correctly in about 20% to 25% of cases.

3.3.2 Impact of up to two adults per household taking part in the survey

There is a small impact on data from obtaining more than one response per household, which results from the increased clustering effects – we would expect people in the same household to have on average similar levels of sport and physical activity which would result in a small loss of precision. However, this loss in precision is more than outweighed by the gain in precision from the resulting less variable within household selection weights. For any estimates that are reported by sex, then the clustering effect within the household is typically negligible as for the vast majority of households with more than one respondent, one will be male and one female.

4 Fieldwork

This section outlines the approach used for fieldwork for the adult survey.

4.1 Letter design

The principles for designing the invitation and reminder letters were based on the Tailored Design Method⁵, along with a host of literature and best practise based on previous studies, that had been reviewed by the research team. The main aim of the letters is to provide all the relevant information a respondent requires, to complete the survey, and to answer immediate questions which they may have.

Our guiding principles for designing the letter were:

- Use simple and easy to understand language, with no unnecessary complicating text
- To cover key messages that needed to be conveyed in the letters including:
 - Importance
 - Motivators for taking part
 - How to take part
 - Your personal data are safe
- Importance (a) was to be conveyed in all four letters⁶ in the following ways:
 - Sport England, OHID, and Arts Council England logos should be prominent;
 - Visual clutter which could distract from the logos and the importance of the survey to be avoided;
 - Professional letter format with address of recipient and full date;
 - Signed by someone with authority (although the public may not have heard of this person, their title should reflect that they are important);
 - Highlight key messages in the text; using these to break up the text and make it easier to read.
- The main motivational statements (b) vary across the four letters, thus increasing the likelihood of converting non-respondents.
 - 1st letter: Help us improve leisure activities in [geography];
 - 2nd letter: Taking part will benefit you, your family and your community in [geography];
 - 3rd letter: We want to hear from as many people as possible;
 - 4th letter: An opportunity to help shape the provision of leisure activities in [geography];

⁵ Dillman, DA. Smyth, JD. Christian, LM. Internet, Phone, Mail and Mixed-Mode Surveys: The Tailored Design Method (2014). Wiley.

⁶ See the following section – Letters and reminder regime – for further details on the four letters

- In addition, letters 2-4 we include the following secondary motivational statement as a heading, to try and encourage participation - We will send you a £5 gift voucher as a 'thank you'. In letter 1 this is included in the text but not emphasised in the same manner.

In addition to this, the letters also provide key information on the organisations involved with the study and contact details for Ipsos should the respondent wish to get in contact about any matter relating to the survey.

4.2 Letters and reminder regime

One of the biggest challenges when conducting self-completion surveys is maximising the survey response rate – we aimed to do this through effective design of materials and optimising our mail-out strategy.

We adopted a push-to-web approach, and the following mailings were despatched monthly (with the day of the week that mailings land varying):

1. Letter sent to all sampled addresses inviting up to two adults to go online and complete the online questionnaire (C5 white envelope, 2nd class postage);
2. A reminder letter was sent one to two weeks after the first invitation to non-responding addresses and addresses where only one adult had completed the online questionnaire but not a second adult (presence of an eligible second adult was determined in the first questionnaire - C5 white envelope, 2nd class postage);
3. Another reminder letter was sent one to two weeks after the first reminder letter to non-responding addresses and addresses where only one adult had completed the online questionnaire but not a second adult (presence of an eligible second adult was determined in the first questionnaire); this mailing included one or two postal questionnaires (C4 white envelope, 2nd class postage);
4. A final reminder letter was sent two weeks after the second reminder letter to non-responding addresses and addresses where only one adult had completed the online or paper questionnaire but not a second adult (presence of an eligible second adult was determined in the first questionnaire). Note that in only a small number of cases are paper questionnaires received back in time to feed into the mailing 4 selection (C5 white envelope, 2nd class postage).

4.3 Covid-19 Insert

In April 2020, against the backdrop of the growing COVID-19 pandemic and first UK lockdown, a leaflet was initially added to all Active Lives mailings, starting with mailing four of Wave 52 (Survey Y5). This leaflet was included within the mailings up to mailing four of Wave 66. The purpose of the new COVID-19 leaflet (see Appendix C) was to encourage people to take part in the survey by highlighting its importance for understanding the impact of the pandemic “on people’s lives, their ability to stay active, and overall wellbeing”.

As lockdown restrictions eased in summer 2020, sports facilities re-opened and some people started returning to work. At this point, the Covid-19 insert was updated, to reflect the changing circumstances. An experiment was undertaken to test whether the insert was still relevant to respondents by measuring its impact on survey response (see Section 8.2).

4.4 Online questionnaire

The Active Lives survey was hosted using our global Dimensions platform in Rackspace, a managed hosting facility and Europe's most successful managed hosting company. The security features offered by Rackspace, and Ipsos are listed below:

At Rackspace:

- Rackspace has SAS 70 type II and Safe Harbor certifications;
- The servers and network infrastructure are physically located in England;
- The servers and network components are fully redundant;
- Rackspace guarantees recovery of hardware failures within one hour.

At Ipsos:

All access to Dimensions' questionnaires and data was password protected. Only a small number of online survey experts had access.

- Survey data and any respondent personal information were stored in separate databases.
- Penetration testing was carried out on our installation to check that there were no problems.
- Paper questionnaires were stored securely and destroyed at the end of the project.

4.4.1 Survey URL

When deciding on a suitable URL for the survey we had to strike a balance between several factors.

- Availability: We had to find an address that was not already in use. This ruled out options such as ALS.com, ALS.co.uk and ActiveLives.com;
- Brevity: We had to choose an address that was short enough for people to remember as we thought this would improve accessibility and would help maximise response rate;
- Engagement/appeal: We wanted the URL to give some indication of the content of the survey as well as linking to the overall branding, the theory being that this would help promote engagement with the survey for all types of respondents.

After considering all our options, we opted for <http://www.activelivessurvey.org/> as it was the most suitable option based on the criteria listed above.

Based on internal timings we estimated that the questionnaire would take around 16 minutes to complete. The median actual completion time was 13 minutes 39 seconds for group 1 compared with 15 minutes and 27 seconds for group 2. The timings data is calculated as the difference between the survey start and finish times. This does not account for respondents who exit the survey and return to it at a later time.

4.5 Postal questionnaire

The push-to-web design aims to maximise online responses, but we were aware that a significant proportion of people would not complete the survey. The four most common reasons for non-completion were:

- Participant not opening the letter;
- Participant not then going online to complete the questionnaire;
- Participant not having online access; and
- Participant would prefer to complete a postal questionnaire.

Inclusion of a postal questionnaire at the second reminder (mailing 3) increased the likelihood of converting these reluctant respondents, though we recognise that a significant proportion of people would still not respond to the survey at all. As detailed in Chapter 2, for practical reasons the postal questionnaire was much shorter than the online questionnaire and covered 16 pages.

The postal questionnaire was designed in conjunction with our survey methodologists and graphic designers. The aim was to produce a document that was as clear and concise as possible thus reducing burden on participants and maximising response rates. The questionnaire was printed on white, A4 paper in a landscape orientation and bound along the top edge. We included several design elements to help participants navigate the questionnaire including:

- The questionnaire was printed mainly using three Sport England brand colours, with highlighted information symbols throughout; these were used to provide definitions or instructions where necessary;
- Arrows were included on rows of grids to indicate if an entire row needed to be completed as this had caused some confusion in the cognitive testing;
- Key instructions were underlined or emboldened; in some cases, a different colour was used to highlight specific information;
- Tick boxes were positioned as closely as possible to row text so there was no confusion around which option was being ticked;
- Where multiple options were available, alternative shading was used on each row.

Before sign-off, we asked the printer to provide physical copies of the questionnaire so we could establish the quality, and the look and feel of the questionnaire.

4.5.1 Storage of scanned images and survey results

All scanned images and survey data were stored on a secure server, which is isolated from the Ipsos network and has restricted access controls. Our secure file servers are housed in server rooms/data centres with appropriate physical access controls and monitoring procedures. The network is protected by appropriate use of firewalls, demilitarized zone (DMZ) and intrusion detection systems. Using a DMZ perimeter network protects Ipsos' internal local-area network (LAN) from untrusted traffic permitting

access to untrusted networks, such as the internet, while ensuring the private network or LAN remains secure. Public facing servers are also appropriately protected and are based on a secure (minimum) two tier or, our general standard, three-tier architecture. All sub-contractors are subject to appropriate quality checks and second party information security audits by our in-house Data Compliance team. We used AES256 as a minimum standard for encryption.

4.6 Incentives

Incentives were used to encourage participation in the survey and boost response rates. £5 conditional vouchers were offered upon completion of the survey.

For online completions, respondents wishing to receive a £5 voucher enter their email address at the end of the survey and are then sent a unique link to a dedicated survey website where they could select a voucher from a list of suppliers. Participants are then emailed a link/code for their voucher which allows them to redeem it.

Respondents who return a postal questionnaire received a £5 Love2Shop paper gift voucher, which can be redeemed in a wide range of high street stores within two weeks of Ipsos receiving the questionnaire. Respondents were asked to give their name in order to address the incentive to the correct person, but even without a name an incentive would be sent to that address.

4.7 Survey website

The main survey landing page (<http://www.activelivessurvey.org/>) included general information about the survey to reassure respondents about the authenticity of the site. The main questionnaires pages were only accessible to those who were invited to take part in the survey by inputting a six-digit alphanumeric password.

The Active Lives survey landing page also included the following:

- A link to Ipsos UK's main website;
- Information on the Active Lives survey privacy policy;
- The Active Lives survey accessibility statement;
- A dedicated email address (activelives@ipsos.com) should participants have any queries before or after completing the survey;
- A frequently asked questions (FAQs) section with a comprehensive list of key questions about the survey designed to reassure respondents and provide help with completing the survey;
- A selection of relevant FAQs translated into British Sign Language.

The Active Lives survey website was designed to be accessed using a variety of devices, including desktop computers, laptops, tablets and smartphones. The aim of this 'device agnostic' approach was to improve accessibility and maximise response rates. A Google analytics tool was setup to monitor the proportion of those accessing the survey through particular devices. This allowed, traffic to the survey website to be monitored throughout the fieldwork period to analyse response patterns and help identify problems with online services or postal deliveries.

The survey website could also be accessed through search engines such as Google and Bing. Most common searches for the survey returned the Sport England Active Lives survey page as the top result. This presents general information and background information about the survey. The link to access the survey website was included towards the bottom of the page.

4.8 Accessibility

The Active Lives survey is designed to be as accessible as possible for all respondents. The functionality of the survey was improved to ensure that content was written and structured using accessible language. The website and documents were assessed by an independent organisation who specialise in reviewing documents to ensure that they were as easy to use as possible. Lessons learned were shared with the GP Patient Survey Team, which already had extensive experience of reviewing content to ensure full accessibility, and they offered further advice about maximising accessibility.

Additionally, the online questionnaire was designed in a way that made it easy for people to adjust colour contrasts and increase font size. Key FAQs were translated into British Sign Language and content was made available in alternative formats and languages when required. This included large prints of the paper questionnaires and the possibility to complete the survey on the telephone in English, Arabic, Polish, Portuguese, Mandarin and Slovak. The language options available were mentioned on the letters sent to potential respondents and were shown using the relevant script and language.

The English Federation for Disability Sport (EFDS) made recommendations to try and improve the accessibility of the survey. Based on these, an accessibility statement was added to the questionnaire homepage and translations of key FAQs into British Sign Language.

4.9 Query management

From the beginning of fieldwork, the survey website contained a list of FAQs and provided information about the survey. A dedicated telephone helpline based in Edinburgh and email address (activelives@ipsos.com) were available for participants to contact if they had any queries about the survey. Sport England also direct other participant queries to Ipsos using their dedicated email address (ActiveLives@sportengland.org).

On a typical month, around 400-450 enquiries from members of the public were received and responded to, of which, 52% were emails and 48% were telephone calls to the Active Lives helpline. Of these, less than 1% constituted a 'complaint'.

Common queries received included participants asking to opt out of the survey, requests for paper questionnaires, general queries about the survey and questions regarding the voucher incentive.

When the survey launched, telephone queries were first recorded by an answer machine and a member of the research team returned the call when they had identified an appropriate solution to their request. Emails sent to the Active Lives inbox were first answered with automatic responses, which included the most commonly asked questions and answers. Each query was then followed up individually.

After the 7th wave of the survey during Year 1, a dedicated helpline team was set up and trained by the core research team to respond to both telephone and email queries to ensure the highest levels of customer service to those enquiring about the Active Lives survey.

The research team had collected a large amount of data on the most common queries and their solutions and wanted to streamline the process of responding to participant feedback. To do so, the helpline team used a specific list of FAQs to help participants with their enquiry or alternatively forwarded them to the core research team on a case by case basis. A third-party supplier was also involved with queries relating to issues with specific voucher codes. Each query was logged in an Excel spreadsheet and a specific code assigned to identify the nature of it. Opt-outs were recorded separately and removed from the sample using their unique reference number to avoid further mailings.

Postal queries were received by Restore PLC, which were then forwarded to Ipsos for sorting. They were then processed in the same way as email or telephone queries depending on the nature of the enquiry and the information available.

5 Response rates

5.1 Method and assumptions

The Active Lives survey seeks to survey up to two adults (aged 16+) in every household. This makes it difficult to calculate an individual response rate as the number of adults in non-participating households is unknown. Therefore, it is more sensible to calculate the proportion of sampled addresses that have responded and additionally calculate the number of respondents per responding address. This method has been utilised previously in similar studies.

To calculate the response rate, it is also important to be able to estimate the proportion of sampled households that are eligible to respond. This is estimated at 92% (derived from face-to-face PAF surveys and used by TNS BMRB for the Active People Survey online pilots and the Community Life online survey). Therefore, the calculation for response rates in the Active Lives survey is as follows:

$$\text{Response Rate} = \text{Addresses where at least one response is received} / (\text{Total addresses sampled} * 0.92)$$

With the calculation for the respondents per responding households as follows:

$$\text{Respondents per responding address} = \text{Total number of respondents} / \text{numbers of responding addresses}$$

It should be noted that in most cases the address corresponds to the household. However, there are a small number of cases where there are multiple households at the address to which the invitation letter is sent.

5.2 Response rates

The survey year for Year 6 ran from the 16 November 2020 – 15 November 2021 (waves 61 – 72). The response rate overall was 22.5% across the survey year with 69.5% of all respondents taking part online and 30.5% filling in a paper questionnaire. The response rate varied between each individual wave. The response rate was as low as 197.9% for Wave 72 and rose as high as 26.0% for Wave 64. There are several possible explanations, which are outlined in the section which follows (on reasons for variations in response rates).

Response rate by wave and mode for year 6

Wave	Response Rate by Wave	Proportion of returns: Online	Proportion of returns: Postal
W61	22.41%	71.28%	28.72%
W62	23.25%	67.62%	32.38%
W63	25.66%	68.87%	31.13%
W64	25.96%	69.33%	30.67%
W65	24.34%	72.41%	27.59%
W66	22.40%	70.11%	29.89%
W67	21.29%	67.83%	32.17%
W68	21.01%	68.70%	31.30%
W69	21.51%	66.93%	33.07%
W70	21.43%	69.24%	30.76%
W71	20.47%	67.72%	32.28%
W72	19.92%	68.02%	31.98%

5.2.1 Reasons for variations of response rate

It is important to note that there are a wide range of external factors, beyond Ipsos's control, which may account for the variation seen in Year 6 in response rate. For instance, the day of the week a survey lands and whether the survey lands during a holiday period, or close to a bank holiday, may have influenced the number of households responding. Although overall deadweight was assumed at 8%, this may have varied between each wave.

During Year 6 of the survey, the target number of responses was 176,950. The number of target returns varied between 200 and 3500 for the 314 LAs in England (for 292 of the 314 LAs the target number of returns was 500). To achieve these targets, the sample design varied between waves. For instance, if a response rate was low in a particular LA, a greater number of households received invitations in following waves than originally planned, and vice versa. The net impact was that there was an increased sample size in areas less likely to respond, which would have negatively impacted on the response rate overall. This is likely to account for some of the variation seen in the response rate across the survey year.

5.2.2 Other evidence for variation in response rate

The push-to-web method is comparatively new in the field of survey research and, as yet, relatively little is known about key determinants of push-to-web survey response rates. However, it appears that they vary with numerous factors including incentive level, letter wording/layout, reminder regime, survey subject matter and, possibly, survey sponsor.

It is generally regarded as particularly important for push-to-web surveys to include an alternative response mode in later reminders. It is known that a significant proportion of the population (just over 10% of households in Great Britain) do not have access to the internet and some respondents are more willing to respond by paper questionnaire than online. Furthermore, there is evidence from the US indicating that inclusion of a postal survey element in a push-to-web survey reduces non-response bias.

In light of the above, a paper questionnaire is sent to respondents at the third reminder stage in the hope that it will increase response rate and reduce non-response bias.

However, it should be noted that overall response rates are generally lower in online surveys than postal only surveys, and available evidence indicates that this applies also to push-to-web surveys even when mail questionnaires are included in later reminders.

It is worth mentioning experiments were carried out in Year 6 to improve the response rates. These experiments are documented in more detail later in this document. While none of these had a significant impact on the response rates, they did impact it slightly. This may account for some of the variation seen in response rate.

5.3 Break-offs

A break-off occurs when a participant enters the online questionnaire but does not complete it. Software allows this abandoned survey data to be captured. These data can be analysed and used to identify problems with the survey, formatting issues on devices (which can arise on an ad-hoc basis due to device updates), indicate questions that respondents find difficult to answer or where there may be technical issues.

It is possible to quantify an overall break-off rate by dividing the number who abandoned the survey by the number who started the questionnaire. It should be noted that cases which had a break-off near the end of the online questionnaire could be included in the dataset. Once the question on number of adults in the household had been answered in the online questionnaire the case was treated as being productive.

The break-off rate for the Active Lives survey is comparatively low. In Year 5 the break-off rate stands at 8.8%. This highlights the effectiveness of the design and format of the device agnostic questionnaire.

5.3.1 Break-offs by section

The survey was split into the following seven broad groups for the break-off analysis:

- Pre-survey: Any pages which you see before the survey begins.
- Art & Culture: Questions relating to whether someone had taken part in a particular art or cultural activity, including when they have done it over the course of the year and how often.
- Sports, fitness and Recreation: Questions relating to activities that the participant has taken part in within the last year. This includes when during the year, they had undertaken them; participants are also asked about the frequency, duration and intensity of the activity, and if they have done it within the last 28 days.
- Engagement: These questions relate to a respondent's habits, motivations, opportunities and volunteering in sport or exercise.
- About You: This includes questions relating to the respondent's health as well as questions to ascertain the respondent's demographic information.
- Community & Life: This includes questions on a participant's wellbeing, their goals and their community.

- Final questions: Questions based around re-contact, and participants are asked if they wish to receive the incentive or not.

Break-off by section for Year 6

Section	Dropout Percentage
1 Pre-Survey	4.0
2 Arts & Culture	4.7
3 Sport, Fitness & Recreation	49.0
4 Engagement	7.7
5 Community & Life	4.0
6 About you	21.8
7 Final questions	9.0

Consistent with years 1-5 of the survey, in year 6 the most breakoffs occurred in the Sport, Fitness and Recreation section. This includes questions on which activities respondents have taken part in within the last 12 months, with a range of follow-up questions depending on when they last took part in the activity. At this stage the questionnaire becomes more complex with a range of drop-down menus, grids and questions, which require higher levels of cognition. Thus, it is perhaps of no surprise that respondents are more likely to break off here rather than at other points in the questionnaire.

In the Sport, Fitness and Recreation section, the highest break-offs were at questions asking about how often, for how long and how intense the activity was in the past 28 days (ACTIV3). This was also the case in Year 1 for both phase 1 and phase 2 of the questionnaire.

Showing the proportion of all break-offs that are ACTIV3, ACTYR or ACTIV1

Question	Proportion
ACTIV3 (how often, for how long and how intense)	23.6
ACTYR (which periods during the year)	7.8
ACTIV1 (which activities done in the last year)	10.5

ACTIV1 is the question with the second highest break-off rate at 10.5%. This question presented respondents with a list of sports, recreational activities and exercises that they may have undertaken, in the past year. This was presented as a list of types of activities. Each header can be clicked on and beneath it is a list of activities the respondent can select, or alternatively they can search for an activity.

ACTYR had the least break-offs at 7.8%. Break-offs may be due to respondent difficulty in recalling when they did the activity in the last year. During cognitive interviews conducted in Year 1, participants struggled with this question and found it difficult to understand – instead they wanted to report when they last did an activity and did not expect to be asked all the periods in which they did it.

5.3.2 Break-off by device

Paradata is collected on a range of different metrics including browser, operating systems, device type and the brand of the device (where applicable). With a device agnostic survey, it is important to look at not only the break-offs by section (and question within that) but by type of device as well. Collecting paradata allows us to do this.

It is important to look at not only the proportion of break-offs by particular devices, but also the completion rates for those devices. A comparison of the two gives an insight into the difficulties that may be faced with the survey on particular devices.

The break-off rate remains higher on mobiles than on desktop/laptop computers or on tablets, as in previous years. Callegaro et al 2015 have suggested that break-off rates tend to be two or three times higher for smartphone respondents compared to desktop/laptop respondents. However, the proportion of respondents completing the survey has increased year-on-year (from 27.5% in Year 5).

Proportion of questionnaires on each device type by completion status of the questionnaire for year 6

Device	Completes n	Completes %	Break-offs n	Break-offs %	Break off rate
Desktop / Laptop	62,599	53.3%	4,387	44.4%	6.5%
Smartphone	36,825	31.4%	3,604	36.5%	8.9%
Tablet	9,323	7.9%	802	8.1%	7.9%
Device unknown/ other	8,623	7.4%	1,078	10.9%	11.1%

5.3.3 Profile of achieved sample

The following table shows the profile of the achieved sample broken down by mode. Note that this is the profile for responses received in Year 6 of the survey (i.e. 16 November 2020 to 15 November 2021).

Profile of the achieved sample (unweighted) in Year 6 by mode

Demographic	CAWI (ONLINE)	PAPER	Total
Base	123,261	54,012	177,273
Gender			
Male	44.8%	43.3%	44.4%
Female	54.8%	56.5%	55.3%
Other	0.4%	0.2%	0.3%
Age			
16-24	7.6%	3.5%	6.3%
25-34	16.0%	6.0%	12.9%
35-44	18.1%	8.7%	15.2%
45-54	18.0%	13.2%	16.5%
55-64	18.4%	21.2%	19.2%
65-74	15.5%	26.0%	18.7%
75-84	5.6%	16.9%	9.0%
85+	0.9%	4.7%	2.1%
NSSEC			
Managerial, administrative and professional occupations (NS-SEC 1-2)	57.3%	46.0%	54.3%
Intermediate occupations (NS-SEC 3)	11.0%	10.6%	10.9%
Small employers and own account workers (NS-SEC 4)	6.1%	8.0%	6.6%
Lower supervisory and technical occupations (NS-SEC 5)	6.3%	8.6%	6.9%
Semi-routine and routine occupations (NS-SEC 6-7)	9.5%	13.2%	10.5%
Long term unemployed or never worked (NS-SEC 8)	2.5%	3.3%	2.7%
Full-time student and other/unclassified (NS-SEC 9)	7.3%	10.4%	8.1%
Working status			
Working full or part time	60.2%	43.1%	55.2%
Unemployed	3.6%	3.1%	3.5%
Not working (e.g. retired, looking after children)	28.7%	49.4%	34.9%
Student full or part time	4.4%	1.9%	3.7%

Demographic	CAWI (ONLINE)	PAPER	Total
Other working status	3.0%	2.4%	2.8%
Ethnicity			
White-British	82.9%	89.4%	84.9%
White-Other	6.6%	4.1%	5.8%
Asian	5.5%	3.1%	4.8%
Black	1.7%	1.4%	1.6%
Chinese	0.8%	0.5%	0.7%
Mixed	1.6%	0.8%	1.4%
Other	0.9%	0.6%	0.8%

The profile of the achieved sample varies from the overall profile of the population. There are several factors that contribute to this:

Survey topic: It has been shown in recent literature that the profile of push-to-web survey respondents varies depending on survey topics, this is likely to have had some impact on the profile of responders. Non-responders may not have a significant interest in the areas that the survey covers and so will not be inclined to complete the questionnaire.

Modern changes in household structure: It has been shown that there is a growing proportion of young adults (between the age of 20-34) that live at home with their parents. These are unlikely to be the individual in the households who opens the mail (as the letter is sent to the household as a whole, and not an individual) and hence has an impact as to who actually completes the survey.

Online population: While the proportion of those online in England is overall very high, there is a significant proportion of certain sub-groups who are not online. They will not be able to complete the survey online and survey fatigue may have set in by the time the second reminder arrives (with the paper questionnaire). This may have some, if only a small, impact on the overall profile and the response rate.

Work to improve the profile of the overall achieved sample and increase return rates was a key part of the Active Lives study in Year 1 and has continued to be so going forward.

6 Weighting

6.1 Design and purpose

6.1.1 Annual sample weights

Weighting is required to reduce the bias in survey estimates and weights are produced to make the weighted achieved sample match the population as closely as possible. For the Active Lives survey the weights correct for the unequal selection of addresses across local authorities and for the selection of adults and youths within households. They also adjust the achieved sample by month to control for seasonality. In addition, the sample is weighted to match ONS mid-year population estimates and national estimates derived from the Annual Population Survey.

The data needs more than one set of weights to take account of the following elements of the design: postal and online data and the need to analyse data in a time series.

The final data includes eight sets of weights:

- `wt_final`: for data collected in both the online and postal questionnaires;
- `wt_final_online`: for data collected in the online questionnaire only;
- `wt_final_B`: for data collected among participants assigned to the online group 1;
- `wt_final_C`: for data collected among participants assigned to the online group 2;
- `wt_final_AB`: for data collected in the postal questionnaire and among participants assigned to the online group 1;
- `wt_final_AC`: for data collected in the postal questionnaire and among participants assigned to the online group 2;
- `wt_time`: for time series analysis of data collected in both the online and postal questionnaires; and
- `wt_online_time` for time series analysis of data collected in the online questionnaire only;

The same weighting strategy was used for each set of weights (this strategy is described below). Note that an approach that weighted each module separately and then combined them would have been less complicated. However, this approach was not an option as the postal sample is issued after the online. The postal sample is therefore not nationally representative and so cannot be treated a separate nationally representative module.

6.1.2 Quarterly and monthly weights

We defined months and quarters by when the questionnaire was completed/returned (rather than issued) and we used survey year months and quarters rather than calendar quarters (see the data validation chapter for more detail on this).

6.2 Outline of weight variants

For most analyses, wt_final and wt_final_online will be the required weights, the former (wt_final) for analyses of the full dataset (online and postal) and the latter (wt_final_online) for measures that are only collected online.

There are also two sets of time series weights (wt_time and wt_online_time) that need to be used for any analysis by month or quarter across the full survey year. The former set (wt_time_all) for the full sample (online and postal) and the latter (wt_online_time) for the sample completing online only. The weights which are needed for different levels of analysis are outlined below.

Weights needed for the different types of analyses.

Weight name	Weight type	Measures	Break variables
wt_final	All: Online and Postal	Participation, Frequency, Duration, Sports spectating, BMI, Fruit and Veg	Any non-time related
wt_final_online	All: Online	As above, but for activity composites only provided online, muscle-strengthening, volunteering measures, and education status	Any non-time related
wt_final_B	Online Group 1	Sexual orientation, religion, club and habit measures	Any non-time related
wt_final_C	Online Group 2	Volunteering (Volmth), Wellbeing, Goals and Community, Loneliness, settings questions	Any non-time related
wt_final_AB	Postal & Online Group 1		Any non-time related
wt_final_AC	Postal & Online Group 2	Volunteering (Volint and volfrq)	Any non-time related
wt_time	All: Online and Postal: time series	Participation, Frequency, Duration, BMI, Fruit and Veg	Month, quarter as breaks or when analysis is being carried out for one month or quarter by other breaks
wt_online_time	All: Online: time series	As above, but for activity composites only provided online and education status	Month, quarter as breaks or when analysis is being carried out for one month or quarter by other breaks

6.3 Methods for creating weights

There were five stages to the weighting strategy:

- Calculation of an individual (within household) selection weight;
- Initial calibration to mid-year population counts for local authority and age/sex and to month counts assuming a proportionate sample;
- A second stage of calibration to the same set of measures (age/sex, local authority and month) as well as to national estimates from the Annual Population Survey;
- Trimming of the second stage of calibration; and
- A final adjustment to regional counts.

We will describe each stage of the weighting for annual weights in detail and then state the difference to produce the time series weights.

W1: Individual (within household) selection weight

Adults (16 or older), were calculated as $W1 = Mhh / mhh$ where mhh is the number of adult participants within the household ($mhh = 1$ or 2) and Mhh is the total number of adults in the household.

To reduce the variance of the weights, and hence increase the efficiency of the sample, the individual selection weight was trimmed at 3.

W2 Initial calibration

The next stage was to calibrate to population counts for local authority and age/sex groups, as well as to month for the two sets of time-series weights that covered the full survey year to ensure that the weighted distribution by month was proportionate. This was done separately for each region with the individual selection weights (W1) used as the starting weights. This weighting stage corrected for the unequal selection probabilities across the local authorities, as well as disproportionate non-response; it also put each age group into its correct proportion. Adjusting for month also balanced the sample to adjust for seasonality.

Note that this initial calibration stage was not trimmed to ensure that the distributions by local authority, age/sex groups and month were as close to the true figures as possible. In fact, trimming at this stage would not have been sensible as it would merely have changed the weights for the very large and very small local authorities and the first few months that had lower returns. These were features of the design that we wanted to correct for, and so trimming the weights would be detrimental.

W3: Second stage of calibration

For the second stage of calibration, national estimates from the Annual Population Survey were added to the set of control totals for: white/non-white, working status by gender, household size, long-term health problem, socio-economic classification (NS-SEC), and highest educational qualification (though, for postal cases, this last was not used at full-year 5). The calibration was done separately for each region and the starting weights were the weights from the previous initial calibration stage (W2).

W4: Trimming of second stage of calibration

To reduce the variance of weights, this calibration stage was trimmed. The weights from this calibration stage (W3) were divided by the initial weights (W2) to give the adjustment factor (fadj). This adjustment factor was trimmed at the 5th and 95th percentiles within region to give the trimmed adjustment factor (ftrim) which when multiplied by the initial weights gave the trimmed calibration weights: $W4 = W2 \times ftrim$.

W5: Re-scale for region

The final stage was an adjustment so that the weighted counts by region were grossed up to the mid-year population counts. This stage simply multiplied all the weights by a constant within each region to give the final grossed weights (W5).

Time-series weights

The time series weights were produced using a parallel approach. However, rather than calibrating separately by region, the calibration was done separately for each month. We did not need to add region as a control total as it was implicitly included from having local authority as a control total – local authorities nest within region.

At the last stage, we re-scaled the weights so that the weighted distribution by month matched that of a proportionate sample.

6.4 Technical information

6.4.1 Statistical efficiency

The table below shows the estimated effective sample size (neff) and corresponding design factor (deft) for the weights. On average the design factor due to weighting is about 1.49 – in other words the width of the confidence intervals around analyses of the corresponding data would be about 49% wider than would be the case if there were no weights. However, some of the variance of the weights is due to the design of the study because smaller local authorities were over-sampled to obtain a minimum sample size. Also, the sample obtained in each month varied during the course of the year. If we take the disproportionate sampling by local authority and differences in the sample size by month into account, then the average design factor is about 1.26.

Design effect

Weight name	N	Unadj NEFF	Unadj DEFT	Adj NEFF	Adj DEFT
wt_final_all	177,735	76,052	1.53	117,387	1.23
wt_final_online	123,261	48,826	1.57	78,637	1.24

6.4.2 Control totals

The control totals for the calibration consisted of 2020 ONS mid-year population estimates and national estimates from the Annual Population Survey July 2020-June 2021. The following tables show the estimates for the control totals used for the weighting. Note that we have not included the control totals for local authority, given the number of data points; however, we have included region.

Control totals used for the weighting by region

HIGHEST EDUCATION	NE	NW	Y&TH	EM	WM	EE	Lon	SE	SW	ALL
Degree or equivalent	18.7%	22.4%	21.4%	19.7%	21.6%	22.0%	42.3%	26.6%	22.5%	25.6%
Higher education	5.1%	4.7%	4.8%	5.8%	5.0%	5.2%	4.3%	5.2%	5.4%	5.0%
GCE A level or equivalent	13.7%	13.2%	13.1%	13.6%	12.5%	12.9%	7.9%	12.6%	13.5%	12.2%
GCSE grades A*-C or equivalent	13.5%	13.4%	12.9%	12.8%	12.1%	14.4%	7.0%	11.4%	11.8%	11.8%
Other qualification	4.3%	4.4%	5.0%	5.5%	5.5%	5.1%	6.6%	4.1%	3.7%	5.0%
No qual / DK	7.0%	5.8%	5.7%	5.4%	6.7%	4.3%	4.2%	3.7%	3.8%	4.9%
Not 25 to 64	37.5%	36.1%	37.0%	37.2%	36.6%	36.1%	27.8%	36.3%	39.2%	35.4%

HOUSEHOLD SIZE	NE	NW	Y&Th	EM	WM	EE	Lon	SE	SW	ALL
One-person h/hold (16+)	18.1%	16.5%	15.7%	12.6%	13.7%	12.9%	13.8%	13.2%	14.4%	14.3%
Other households (16+)	81.9%	83.5%	84.3%	87.4%	86.3%	87.1%	86.2%	86.8%	85.6%	85.7%

ETHNIC GROUP	NE	NW	Y&Th	EM	WM	EE	Lon	SE	SW	ALL
White (16+)	95.3%	90.7%	90.9%	89.2%	83.1%	90.9%	62.8%	90.7%	95.6%	86.1%
Non-white (16+)	4.7%	9.3%	9.1%	10.8%	16.9%	9.1%	37.2%	9.3%	4.4%	13.9%

WORKING STATUS / GENDER	NE	NW	Y&TH	EM	WM	EE	Lon	SE	SW	ALL
Males 16-74 FT	24.5%	26.5%	27.0%	26.9%	27.1%	28.3%	30.8%	28.3%	26.2%	27.7%
Other males 16+	24.2%	22.5%	22.1%	22.3%	22.1%	20.6%	18.9%	20.6%	22.6%	21.4%
Females 16-74 FT	16.5%	18.0%	16.8%	16.6%	17.5%	17.4%	21.8%	17.9%	16.1%	18.0%
Other females 16+	34.8%	32.9%	34.1%	34.3%	33.3%	33.6%	28.4%	33.2%	35.1%	32.9%

NS SEC	NE	NW	Y&Th	EM	WM	EE	Lon	SE	SW	ALL
Managerial/professional	22.8%	27.3%	26.3%	25.9%	26.7%	29.6%	39.1%	32.3%	27.4%	29.8%
Intermediate	9.2%	9.4%	8.8%	9.2%	9.0%	9.6%	8.5%	9.4%	8.0%	9.0%
Self-employed and own account workers	4.8%	5.2%	5.1%	5.5%	4.9%	6.2%	5.8%	5.8%	6.2%	5.6%
Lower supervisory/technical	4.1%	3.9%	3.7%	4.0%	4.0%	3.7%	2.8%	3.6%	4.0%	3.7%
Semi routine and routine	16.3%	14.3%	15.9%	16.4%	14.9%	13.1%	9.3%	11.3%	14.0%	13.3%
Never worked, LTE and students	15.9%	14.0%	14.1%	12.3%	14.5%	10.7%	15.9%	10.9%	10.9%	13.1%
Unclassified	2.6%	2.8%	2.8%	2.6%	2.9%	2.5%	3.4%	2.4%	2.4%	2.8%
75+	24.3%	23.1%	23.2%	24.1%	23.2%	24.6%	15.0%	24.1%	27.1%	22.7%

LONG TERM HEALTH PROBLEM	NE	NW	Y&TH	EM	WM	EE	Lon	SE	SW	ALL
Health problems	43.1%	40.6%	41.8%	45.0%	39.8%	40.6%	30.7%	40.1%	41.9%	39.6%
None/missing	56.9%	59.4%	58.2%	55.0%	60.2%	59.4%	69.3%	59.9%	58.1%	60.4%

AGE / GENDER	NE	NW	Y&TH	EM	WM	EE	Lon	SE	SW	ALL
Males 16-24	6.8%	6.6%	7.0%	6.7%	6.9%	5.9%	6.4%	6.3%	6.2%	6.5%
Males 25-34	7.9%	8.3%	8.2%	7.8%	8.5%	7.7%	11.4%	7.4%	7.3%	8.4%
Males 35-44	6.9%	7.5%	7.3%	7.2%	7.5%	7.8%	10.7%	7.7%	6.9%	7.9%
Males 45-54	7.5%	7.9%	7.9%	8.1%	8.0%	8.2%	8.1%	8.4%	7.8%	8.0%
Males 55-64	8.2%	7.9%	7.8%	8.0%	7.6%	7.9%	6.3%	7.9%	8.1%	7.6%
Males 65-74	6.6%	6.2%	6.2%	6.5%	6.0%	6.3%	3.9%	6.2%	7.0%	5.9%
Males 75+	4.7%	4.6%	4.6%	4.9%	4.8%	5.1%	2.9%	5.0%	5.7%	4.6%
Females 16-24	6.4%	6.4%	6.8%	6.4%	6.6%	5.6%	6.4%	5.9%	5.9%	6.2%
Females 25-34	7.8%	8.1%	8.0%	7.7%	8.2%	7.6%	11.1%	7.3%	7.1%	8.3%
Females 35-44	7.3%	7.7%	7.6%	7.5%	7.7%	8.1%	10.0%	8.1%	7.1%	8.1%
Females 45-54	8.0%	8.2%	8.1%	8.3%	8.1%	8.5%	8.1%	8.6%	8.1%	8.3%
Females 55-64	8.7%	8.2%	8.0%	8.2%	7.8%	8.1%	6.6%	8.1%	8.5%	7.9%
Females 65-74	7.1%	6.6%	6.6%	6.9%	6.4%	6.9%	4.4%	6.7%	7.5%	6.4%
Females 75+	5.9%	5.7%	5.8%	5.9%	6.0%	6.3%	3.8%	6.2%	6.9%	5.7%

MONTH	NE	NW	Y&TH	EM	WM	EE	Lon	SE	SW	ALL
Jan	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%
Feb	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%
Mar	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%
Apr	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
May	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%
Jun	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Jul	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%
Aug	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%
Sep	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Oct	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%
Nov	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Dec	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%

REGION	Count	%
North East	2,192,654	4.8%
North West	5,935,489	13.1%
Yorkshire and The Humber	4,452,385	9.8%
East Midlands	3,935,510	8.7%
West Midlands	4,766,193	10.5%
East	5,024,031	11.0%
London	7,118,408	15.7%
South East	7,412,711	16.3%
South West	4,632,901	10.2%
All	45,470,282	100.0%

7 Data validation and management

7.1 Overview

7.1.1 Questionnaire versions

As described in earlier sections, the data have been collected from two sources: an online questionnaire and a paper questionnaire. The online questionnaire includes some built-in routing and checks within it, whereas the paper questionnaire relies on correct navigation by respondents and there is no constraint on the answers they can give.

In addition, the online data are available immediately in the office in their raw form, however the paper questionnaire data must be scanned and keyed as part of a separate process. Tick box answers are captured by scanning and numbers and other verbatim answers are captured by keying. These data are delivered in weekly batches and there is potential for errors to be introduced during the process of scanning and keying.

All this means that in the early stages of the data processing, the paper questionnaire data should be handled separately from the online data and are also subject to a higher level of checking and editing than the online data.

Within the online questionnaire there are two routes through the questionnaire, each taken by half the online sample, with some questions only asked by group 1 and some by group 2.

This section describes the processes by which the data were cleaned and edited, merged together and duplicates removed. These different questionnaire versions also have implications for how missing data are handled and described and how derived variables are created.

7.1.2 Month of data collection

The fieldwork section has described how the survey sample is divided into waves and issued once a month. The fieldwork cycle for a single wave lasts about five to six weeks. The data analysis involves cutting off cases by month of response to the questionnaire. For data analysis, there are 12 months, starting on the 16th of the month and finishing on the 15th of the following month (November 2018 to November 2019).

Within the data for one month, there may be cases issued over several different waves. For example, in month 3 (January 2019 - February 2019) data could come from surveys distributed during waves 37, 38 or 39 of the survey. The date of completion of the questionnaire is important for the way in which data are handled and weighted. Online data come with an automatic date stamp and it is known exactly when the questionnaire was completed.

Where a valid date of completion was put on the questionnaire, consistent with the timing of that case being issued and the questionnaire being returned, the date given by the respondent is taken as the date of return. In some cases, respondents give no date, give an incomplete date, or give a date which is impossible (e.g. after the date the questionnaire was received in the office or before the questionnaire was sent to the respondent). In these cases, the date of receipt is assumed to be 2-3 days before the date the questionnaire was processed by the scanning agency.

7.2 Data editing

7.2.1 Postal data – Forced edits

The postal data are subject to errors introduced by respondents, as well as errors resulting from scanning or keying errors. Many of these errors can be dealt with through standard edit rules. For example, if a single code question has more than one category ticked, it is set to 'missing – incorrectly multi-coded'. If a routed question is asked when it should not be, then it can be set to not applicable and the original answer over-written. If a respondent says there are no adults in the household (including them), then the answer can be set to be 1 since we assume that they excluded themselves (although of course if someone wrote 1, when they should have given an answer of 2, this is less easy to identify).

Many respondents ticked all the qualifications they had, rather than the highest one, a forced edit was used to retain the highest qualification. For the sport and activity data, if someone did not tick they did it in the last year, but then provided data on their participation in the last 28 days, the data were edited to record that they had done the activity in the last year. A full record is kept of the forced edits done on the data. These edits are done to improve the quality of the data and to make them more consistent and easier to analyse.

7.2.2 Postal data – Manual edits

In examining the early data from the paper questionnaire and comparing it with the scanned data, it was apparent that there were certain common errors in the data which would either not be corrected by forced edits, or where a forced edit might lead to unnecessary missing data. For example, respondents sometimes start ticking in one row on the activity grid, but then mistakenly move up or down a line, further along the row. This means they may say they have walked for travel in the last year, then have no further data on that row, but on walking for leisure have information on participation in the last month, but no data about the last year.

It was common for people to tick no to the question about disability and then change their answer to yes. In a forced edit this would be treated as missing because multiple answers were given but in looking at the questionnaire it was possible to see the no answer had been crossed out, but both were picked up by the scanner. Therefore, alongside the forced edits a series of manual edits were specified. These were for errors which might be corrected better by viewing the questionnaire.

A bespoke computer software was developed which allows the scanned page to be viewed against the data captured and for an operator to make edits to the data. These corrections can then be output and applied to the data. Screen shots are shown on the next page. The edits identified through the automated editing as needing manual input are fed into the program and operators review all the manual edits and decide about whether to make a change. A cover page lists each error and by selecting that error the operator is taken to the correct page.

Example of the paper questionnaire editing tool

Batch / Serial 160630010001 160630321952581

Flag Form Mark page reviewed Cancel changes Save changes

Q2 Listed below are types of walking, cycling, gardening and dance which you may have done within the past 12 months. Please ✓ all activities that you have done within the past 12 months; answering the follow up questions for each activity as appropriate

	Have you done this activity in the past 12 months? If you haven't please leave the box blank		Have you done this activity in the past 4 weeks? If you haven't please leave the box blank		If you have done this activity during the past 4 weeks could you tell us... on how many days you did it?			the time you usually spent on the activity per day			if the effort you usually put into the activity was enough to		make you out of breath or sweat	
	Yes	No	Yes	No	Days (in past 4 weeks)	Hours (per day)	Mins (per day)	raise your breathing rate	No	Yes	No	Yes	No	
Walking ①														
Walking for travel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	8	0	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Walking for leisure (incl. dog walking and rambling)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Cycling														
Cycling for travel (including commuting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cycling for leisure and all other cycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Gardening														
Gardening	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	7	0	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Dancing														
Creative or artistic dance ②	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other types of dance ③	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

I have not done any of these activities in the past 12 months ☐

① Walking: Include all continuous walks of at least 10 minutes without stopping. If you stop for short breaks, such as waiting to cross a road this still counts as continuous. Exclude walking around the shops. Include walking a dog as leisure walking. Mountain/hill walking and hiking should be included at the next question on page 5

② Creative or artistic dance: For example ballet, ballroom, belly dancing, contemporary, contact improvisation, Flamenco, folk, hip-hop, historical/period, Irish, jazz, jive, Latin American, line or square dancing, salsa, street dance, South Asian, tango or tap

③ Other types of dance: Dance based fitness classes/Zumba should be included under the fitness section later in the questionnaire

3

Walking for travel	<input type="checkbox"/>	<input type="checkbox"/>											
Walking for leisure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	8			0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Cycling for travel	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cycling for leisure	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gardening	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	7	0	2	0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Creative or artistic dance	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other types of dance	<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Form 22 of 24 Rand Magnify Page 3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Written instructions are provided to coders to explain what should be done and the kinds of problems to be rectified at each question. Options include:

- No change – data are as captured and associated forced edit will deal with any problems;
- Change because captured data are not what was written or intended by respondent (e.g. multi-code had one answer crossed out and so the crossed-out answer can be removed, a 7 read as 1, etc.);
- Change because data are what was written but an obvious error was made which can be rectified (e.g. answers to breathing questions ticked in wrong row, when it is clear which activity they should be applied to, it is clear that 'no' to out of breath and sweaty was used to mean 'I didn't do the activity').

Any complex cases which the coder has queries about are flagged and reviewed by a researcher. The data are then output into an error file which is applied to the data and the manually edited data are thus captured, alongside any remaining forced edits.

7.2.3 Online data

The online data need less editing as the checks and edits are found within the questionnaire. For example, extreme high values of time spent doing activities, or durations of less than 10 minutes are checked. Where multiple answers are selected on single code answer questions, respondents are asked to correct their answers. After the data were received in the office, rules were set for defining missing values and a small number of further edits were possible.

7.2.4 Missing values

In the survey data, there are various reasons why a question may not have been answered. On the postal data, a question which should have been answered may have been missed by respondents. On the online survey, to allow respondents to proceed past questions which they may not know the answer to or do not wish to answer, codes are used for the answers which allow them to say, 'don't know' or 'prefer not to say'. There are also questions which may not be applicable because they were not asked for respondents.

Missing values and codes used

Code used	Description
-99	Missing, should have been answered
-98	Not applicable: Survey routing
-97	Incorrectly multi-coded
-96	Out of range
-95	Don't know/Cannot give estimate
-94	Prefer not to say

Wherever possible, the base for questions has been set to all participants. However, for questions not asked at all for one group, missing values must be used.

For the main activity measures (e.g. whether participated at least twice in the last 28 days, or at least 150 minutes of moderate intensity activity in the last 28 days) the base is all participants. If there are missing data on one of the activities, this is just treated as not having done the activity. This is because there are so many different activities asked about and so many different variables which feed in (number of sessions, minutes and two intensity questions) that if anyone with missing data on one or more of these variables were excluded, there would be a huge number of respondents for whom these key measures could not be calculated. Furthermore, the questionnaire was designed that the absence of a tick for having done the activity in the last year is treated as not having it done the activity, so there are no missing data on whether the activity was done in the last year.

7.3 Back-coding of other sports

7.3.1 Capturing open data on other sports and activities

In the online questionnaire, respondents were offered a list of about 180 different activities to choose from, many of which included several activities within them (e.g. squash and racquetball) and some of which appeared multiple times to aid respondents in finding them. Nonetheless, there were still activities which people did over the last year which were not in our list of activities or which they had not found in the list. Also, on the paper questionnaire, only about 50 activities are offered on the list.

Therefore, both the online and paper questionnaire offered a space for respondents to record other activities which they did in the last year and last 28 days and to provide details on the frequency, duration and intensity. For this data to feed into the main data set these needed to be coded into the categories of activities. These categories included those provided on the questionnaire as well as a few additional categories for activities which were mentioned but were not in the original list (e.g. high ropes courses).

7.3.2 Coding the answers

A coding scheme was created which included all the answers from the online and postal questionnaires, some additional generic responses (e.g. football where the type was not specified) and new activities not included in the original scheme. In addition, a code was created for instances where multiple relevant activities were included in one other answer so they could feed into overall composites, and codes were created for arts activities and for activities which were not relevant at all (to ensure they did not feed into the composites).

All the answers were brought together in Excel. A VLOOKUP was used to automatically code any answers which were worded exactly as the code was labelled. All remaining other answers were manually coded against the code list. All manually coded answers were added to the master look up list which was used for a VLOOKUP in later rounds of back coding. Over time the master list became longer, and the most common activities could be automatically coded using the VLOOKUP, but any which could not be manually coded.

At the end of the process all other answers had been assigned a code which indicated which type of activity they were, which could then be used in the derivation of the participation and composite variables. Once codes had been assigned to all open-ended responses, the coded data was then merged back into the main dataset. To do this, the data was pulled into an SPSS file, then matched back onto the core data by serial and mode. This combination of matching variables ensured that each case was unique in the coding and the data, thereby making certain cases were matched back correctly.

Once the coded data had been matched back onto the core data, a great deal of care had to be taken to ensure that derived variables correctly captured response data.

If the data were added into raw variables too soon, the derived variables would have been calculated incorrectly. To mitigate against this the other back coded data were treated separately, with derived variables being created for these other variables, as for the standard activity variables. Data was then back-coded as a very last step in the data-processing. This ensured that the duration measure, for example, was created as the sum of the durations of the pre-coded activity and the back-coded activity.

Any capping and imputation of activity lengths (as described below) was also applied to the 'other' codes. This was done by creating the values for each activity, then applying these to the 'other specify' codes, per the specific activity mentioned.

7.4 Deduplication

As documented in the fieldwork section, reminder letters were sent to all households in which two adults had not responded to the survey. In any survey involving a postal element (whether invitation and/or completion), there is a delay between a survey being completed and returned by the respondent and its being processed on receipt. This introduces the possibility of reminder letters being sent to households where the survey has already been completed by one or two adults. In turn, this can cause duplicate responses, where either a single respondent completes the survey a second time, or where more than two people in a household complete the survey.

As such, there were two potential forms of duplicate response within the final Active Lives survey data: individual level duplicates and household level duplicates. Where this occurred, it was necessary to identify and remove duplicate responses from the final dataset. Because each household was provided with two online logins and up to two paper questionnaires it was possible for a single household to complete four questionnaires. Individual duplicates occurred where the same person completed two questionnaires. Household duplicates occurred when more than two different people in the household completed a questionnaire.

As a first step, all cases were identified where the same serial number had been used more than once. These cases were compared, and, where the same age and gender was provided, were assumed to have been received from the same person. To ensure that as much data as possible was kept, online responses were prioritised over paper responses (since the online questionnaire was more comprehensive and allowed for more sophisticated routing).

After individual duplicates, had been removed, responses were checked to ensure that there was a maximum of two responses from adults in a single household. Where more than two responses had been received, cases were again prioritised by mode and date, and 'duplicate' responses removed from the data.

Following this process of deduplication, it was assumed that all responses in the dataset were from unique individuals. Even after this process, it was possible that unique responses had been provided using the same survey serial number (where two different people both completed the survey using the same serial – one online and one on paper). For the sake of clarity, these 'legitimate' duplicate responses were sorted by mode and date, and renumbered to ensure that each case in the data had a unique ID. These cases have a final digit in the serial number of 3 or 4 rather than 1 or 2.

7.5 Selection of cases to be included

Sometimes online participants break off before the end of the questionnaire. If this is close to the end, their data can still be useful, since the survey routing will dictate that they must have completed all questions for which they were eligible until that point. Similarly, postal participants sometimes break off, or in other cases miss questions within the questionnaire. This can result in significant quantities of missing data, since routing cannot be enforced within a postal questionnaire. We can include cases which don't have complete data but if all demographic or all activity data are missing then they need to be excluded. Sometimes completely, or almost completely blank postal questionnaires are returned, or questionnaires which have been written across but not filled in.

Survey responses were checked at several stages to ensure that only cases with useful data were included. At the initial data collation stage, the scanning agency removed obviously blank paper questionnaires. Following this, during data processing, rules were enforced for the paper and online surveys to ensure that participants had provided sufficient data to make their data useful. For the online survey, this meant participant had to reach a certain point in the questionnaire for their data to count as valid. Paper data was judged by the completion of specific key questions that were vital for survey weighting and analysis.

7.6 Checking of combined final file

7.6.1 Checking raw data

Once the final data had been collated and all illegitimate responses removed, further checks were undertaken. Firstly, all variables were checked to ensure that the number and patterns of response tallied with what was expected based on the survey routing. Once this was confirmed, further sense-checks were conducted to ensure that the broad pattern of responses made sense against what might be expected.

When processing postal responses, questionnaire serials are occasionally incorrectly entered. This can be caused by the barcode being smudged, causing the scanning software to read it incorrectly, or by the barcode being completely obscured (sometimes by the participant) such that manual entry of the serial is required, with a mistake then being made by the data entry clerk. It was necessary to ensure that all cases had a valid serial, so that important demographic information could be matched back into the final datafile. This was achieved by firstly comparing the final datafile against the original sample to identify cases with invalid serials. These cases were then rechecked against the sample to find the closest matching 'genuine' serial. Following that, a final sense check was carried out to ensure that the suggested matching serial was sufficiently similar to the scanned serial. In all cases, either digits had

been transposed, or a typographic error had been made (e.g. a visually similar number was inserted). There was one case which could not be matched to a sample serial: this case was dropped from the data.

7.6.2 Checking final survey weights

After the survey weights had been created the following checks were carried out:

- that the weighted profile of respondents matches the weighting targets as closely as possible;
- that the range of weights is not excessive (note that the sample design for this study means that there are large weights);
- that the weights correspond correctly to the mode, phase and group for that case;
- that every case has a weight >0 for each of the weighting variables where relevant; and,
- that the weighted analysis is different from the unweighted analysis but that the difference is of the scale and direction expected.

7.7 Imputation and cleaning

Early analysis of the data from the first few months of the year highlighted some common errors made by participants. These included:

- Putting time spent on activities for the whole month rather than a session;
- Providing a figure greater than 28 days for number of days participated in an activity in the last four weeks;
- Putting *minutes* in the *hours* box (e.g. 20 hours instead of 20 minutes);
- Not answering all the questions needed to create some of the key participation variables (e.g. providing days and missing hours and minutes);
- Double counting activities, especially in the gym (e.g. recording that they did a combined session as well as recording each individual activity within it);
- Recording the same activity in “other” and under the provided code (which may be correct) which means even in online data, when combined it can generate high numbers of days in a month spent on one activity when back code data are put back into the main code for an activity;
- Recording a height and weight combination which results in an improbable BMI.

These errors were handled in various points of data processing.

Some of these errors were corrected in initial edits (e.g. answers of >23 hours per session are not permitted, and in manual checking some obvious mistakes can be corrected). However, some of these errors cannot be rectified by manual checks of raw data since they only manifest themselves in creating derived variables, or because there is no clear way to correct them. At the same time, because the activities build across composite variables, it was necessary to take action to manage extreme values. It was also important to compensate for missing data at key variables, because if every case with missing

or extreme data on one of the components feeding into the key sports participation variables was excluded there would have been too much missing data. Nonetheless there are some missing data which could not be compensated for (e.g. missing days): where days are missing, it was assumed that time spent doing the activity in the month was 0.

After a period of testing against early data and discussion between Sport England and Ipsos, a protocol was agreed for dealing with these issues:

- Where people provided information about the frequency with which they undertook an activity but did not provide sufficient information to calculate the duration of session (time spent on an activity per day) the session value was imputed as the median session duration for that activity.
- Extreme session values were capped to remove outliers. The upper limit was set as the 95th percentile for durations for each activity except where there were insufficient cases to calculate the percentile. In this instance, the 95th percentile for a similar activity was used as the cap limit.
- To handle the same gym or fitness activities being entered twice (under a combined gym session, and under each individual activity done within the session), a series of flags was created which suggested duplication of gym activities:
 - If all session lengths add up to the sum of the combined session
 - If total days across all fitness activities sum to more than 28
 - If the number of days equal the number of days for the combined session
 - Where both combined sessions and individual activities are reported, and the individual activities are short (say less than 15 minutes)

Where an individual reported a combined gym session *and* also reported completing at least two individual activities *and* triggered at least two rules from the list above, then it was assumed that they had duplicated their responses. In these cases, individual sessions data were removed in creating the derived variables so that just the combined gym session remains (for all measures involving data in last 28 days – weekly participation, twice monthly, frequency, duration, MEM28 and MEM7 – but not for participation in the last 12 months).

7.8 Creation of derived variables

7.8.1 Activity derived variables

During the processing of the final data, ‘derived variables’ were created. These variables combine data from multiple questions to create activity level measures of participation. These variables were created using SPSS syntax to calculate the duration, frequency and intensity with which people participate in activities. These variables were then used to create headline measures of activity, such as twice monthly participation.

7.8.2 Creation of composite sports

Once derived variables had been created at activity level, they were then aggregated up to create measures of participation spanning whole sports or groups of sports. This was done by summing the measures for each individual activity (or, for binary Yes/No measures, by counting a mention of Yes at

any individual activity). For example, data for the following activities was combined into a single code of 'Racquet sports':

- Tennis;
- Badminton;
- Squash & Racquetball; and
- Table Tennis.

Overall measures of activity were also created. These measures reflected the Chief Medical Officer's recommendations on activity levels, and aggregated minutes, frequency, and intensity of activity per week across *all* activities, grouping individuals into those who are active, fairly active and inactive.

7.8.3 Demographic derived variables

In addition to the activity and composite measures, demographic and geographic variables were created from the raw questionnaire data and from sample data. These included, for example, variables grouping age, ethnicity, physical impairment, socio-economic classification and educational status. Other individual level health measures were also created, including BMI score and portions of fruit and vegetables eaten the day before the participant completed the questionnaire.

7.9 The checks on the derived variables

Once the derived variables had been created, a variety of checks were performed to ensure that they had been calculated correctly.

7.9.1 Checking activity and sports measures

The main activity related derived variables are created for multiple composite activities (as described above). Initially, checks were carried out at the activity level. Firstly, the hard logic of the syntax used to derive each measure was checked against the specification. Next, selected activities were tested by cross tabulating the raw (source) variables against the derived variables to confirm that the data matched as it should. Finally, multiple scenarios were tested to ensure that more complex questionnaire responses did not 'break' the routing. This included checking cases where data for specific input variables was missing, out of range or had been imputed or capped. In addition, checks were conducted to ensure that other answers were feeding into participation measures correctly.

The composite sports variables were only created once it was confirmed that the individual activity variables had been derived correctly. Checks were also needed to ensure that the correct activities fed into each composite, which would then be used for multiple participation variables. Primarily, the SPSS syntax was checked against the specification (which was itself checked and signed off by the Sport England team) to ensure that composite variables were defined correctly. It was not possible to check every single participation measure for each composite. Instead, for one participation measure (twelve monthly participation), all the composites were checked to ensure that all cases where a participant had mentioned an individual activity were counted towards the composite variable. Then for a single composite, all the participation measures were checked to ensure they had been created correctly.

Comparisons were made between different participation measures to check that the way in which they related was consistent with how they had been defined. Where inconsistencies were found, these were investigated, and corrections made.

Where problems were found, the syntax was corrected, the variables recreated, and the checks repeated to ensure that the final data were correct.

7.9.2 Checking demographic variables

Demographic variables were checked primarily by cross tabulation of the raw variables against the derived variables. A sense check was applied to variables to ensure that the frequencies 'looked' right – for example by checking IMD quartiles against Local Authority. Finally, the demographic variables were checked against each other to ensure that they were internally consistent. This included checking that age bands tallied across variables and that derived variables which used the same source data contained the same number of valid responses.

7.10 Confidence Intervals

The Active Lives data is collected from a survey meaning all figures calculated are estimates and contain a margin of error, the confidence interval. Confidence intervals indicate that if repeated samples were taken and confidence intervals computed for each sample, 95% of the intervals would contain the true value. Confidence intervals are important to consider when it comes to analysing the Active Lives dataset, especially when drawing out inferences from the data. A figure with a wide confidence interval may not be as robust a statistic as one with a narrow confidence interval.

Confidence intervals vary for each measure and each demographic breakdown and will vary from year to year. Confidence intervals should be calculated using the complex survey package in SPSS, which takes account of design effects.

7.11 Significance Testing

The Active Lives survey collects approximately 180,000 responses, and as such, there will naturally be small fluctuations when we compare figures for November 2020 – 2021 against November 2019 – 2020. It is important to ensure that any reported changes are genuine, not just differences within the margin of error. Therefore, significance testing should be applied when comparing figures to check whether changes observed across survey years are likely to be 'true' changes in the population, rather than just observed by chance. Significance testing is important to consider in any analysis of the Active Lives dataset, particularly for queries with low response counts where natural fluctuations between years is likely to be greater.

To run significance tests, standard errors (SE) should be generated using the complex samples module in SPSS. These are applied to t-tests using a 5% significance level to assess statistical significance as follows:

- Design effects (DE) = $SE / (R * (1 - R) / B)^{0.5}$
- Effective Sample size (ES) = $B / (DE^2)$
- Difference between estimates (Diff) = $R2 - R1$
- Standard error of difference between estimates (SEDiff) = $((R1 * (1 - R1)) / ES1 + (R2 * (1 - R2)) / ES2)^{0.5}$
- Z value = $Diff / SEDiff$
- P value = $2 * (1 - NORM.S.DIST(ABS(z \text{ value}), 1))$

- Significant if $Z \leq 0.05$ (at 95% level)

Where

- B = observed sample base
- R = rate
- R1 = rate of observations 1
- R2 = rate of observation 2
- ES1 = effective sample size of observation 1
- ES2 = effective sample size of observation 2

When commenting on any Active Lives results, only differences which are statistically significant should be reported on as differences.

8 Experiments

8.1 M2 Red Letter Experiment

The Red-Letter Experiment was initially conducted in Year 5. In Wave 64 (February 2021, Year 6) we started using the red letter for M2 across the full sample. Full details of the design and findings of the experiment can be found in the Y5 Technical Report.

We invite households to take part online and then send three reminder letters to prompt response, the second of which is accompanied by one or two postal questionnaires. The letters sent at each mailing vary in layout and tone to maximise the chance of appealing to a range of sample members. However, one aspect of the design that remained constant was colour palette – all letters used the same turquoise colour. The purpose of this experiment was to trial an alternative design for the first reminder letter (“M2”) using a different, red colour palette. The test design’s red colour palette was chosen because it had seen success in a recent trial of push-to-web methods for the Department for Education’s Childcare and Early Years Survey of Parents.

Households who had not responded fully to M1 were sent the first reminder letter. These addresses were randomly assigned to either the Test group (received the red letters) or the control group (received the standard version of M2). Households were stratified by local authority before condition assignment so that regional differences could not confound the experiment’s results.

We carried out the experiment across Wave 52 (February – March 2020) and Waves 57-59 (July – October 2020) in Y5. In Wave 52 the test version of the M2 letter was associated with a significantly higher household response rate, while in Waves 57-59 there was no discernible effect of M2 design on household response rate.

In W52 the proportion of returns made online was numerically higher in the test group than in the control group, but this difference did not reach the threshold for statistical significance. In W57-59, the sample size for the test condition was increased so this effect could be re-assessed with greater power. However, there was again no discernible effect on mode in any of the waves.

While the test version of M2 appeared to improve the household response rate in Wave 52, we did not replicate this effect in the follow-up. The proportion of returns made online was also numerically higher in the test condition in Wave 52 but not in the follow-up. It is unclear whether the failure to replicate indicates that the Wave 52 result was a false positive or whether the findings were specific to the circumstances in which the experiment was carried out. Overall, the evidence for a positive effect of the test version of M2 was limited, but there was no evidence of it having a significant detrimental effect in any wave. Therefore, the decision was taken to use the test version of M2 for the full sample starting in Y6.

9 Appendices

9.1 Appendix A – Geographical breakdown of survey response

LA	Achieved	Target
Adur	492	500
Allerdale	493	500
Amber Valley	500	500
Arun	507	500
Ashfield	480	500
Ashford	492	500
Babergh	494	500
Barking and Dagenham	516	500
Barnet	512	500
Barnsley	495	500
Barrow-in-Furness	490	500
Basildon	485	500
Basingstoke and Deane	493	500
Bassetlaw	475	500
Bath and North East Somerset	499	500
Bedford	509	500
Bexley	497	500
Birmingham	1993	2000
Blaby	525	500
Blackburn with Darwen	547	500
Blackpool	502	500
Bolsover	509	500
Bolton	989	1000
Boston	488	500
Bournemouth, Christchurch and Poole	490	500
Bracknell Forest	507	500
Bradford	489	500
Braintree	482	500
Breckland	499	500
Brent	507	500
Brentwood	498	500
Brighton and Hove	513	500
Bristol, City of	2048	2000

LA	Achieved	Target
Broadland	520	500
Bromley	495	500
Bromsgrove	492	500
Broxbourne	516	500
Broxtowe	505	500
Buckinghamshire	518	500
Burnley	496	500
Bury	1036	1000
Calderdale	1014	1000
Cambridge	516	500
Camden	506	500
Cannock Chase	491	500
Canterbury	497	500
Carlisle	528	500
Castle Point	508	500
Central Bedfordshire	517	500
Charnwood	546	500
Chelmsford	503	500
Cheltenham	469	500
Cherwell	521	500
Cheshire East	504	500
Cheshire West and Chester	511	500
Chesterfield	522	500
Chichester	497	500
Chorley	485	500
City of London	312	250
Colchester	499	500
Copeland	512	500
Corby	491	500
Cornwall	509	500
Cotswold	495	500
County Durham	512	500
Coventry	971	1000
Craven	523	500
Crawley	510	500
Croydon	503	500
Dacorum	485	500

LA	Achieved	Target
Darlington	485	500
Dartford	507	500
Daventry	509	500
Derby	471	500
Derbyshire Dales	505	500
Doncaster	3412	3500
Dorset	510	500
Dover	512	500
Dudley	496	500
Ealing	508	500
East Cambridgeshire	519	500
East Devon	471	500
East Hampshire	484	500
East Hertfordshire	504	500
East Lindsey	470	500
East Northamptonshire	500	500
East Riding of Yorkshire	522	500
East Staffordshire	488	500
East Suffolk	523	500
Eastbourne	503	500
Eastleigh	518	500
Eden	473	500
Elmbridge	495	500
Enfield	488	500
Epping Forest	505	500
Epsom and Ewell	499	500
Erewash	489	500
Exeter	520	500
Fareham	507	500
Fenland	474	500
Folkestone and Hythe	501	500
Forest of Dean	500	500
Fylde	494	500
Gateshead	522	500
Gedling	502	500
Gloucester	500	500
Gosport	500	500

LA	Achieved	Target
Gravesham	480	500
Great Yarmouth	523	500
Greenwich	495	500
Guildford	489	500
Hackney	484	500
Halton	492	500
Hambleton	475	500
Hammersmith and Fulham	477	500
Harborough	515	500
Haringey	485	500
Harlow	491	500
Harrogate	495	500
Harrow	496	500
Hart	498	500
Hartlepool	519	500
Hastings	514	500
Havant	495	500
Havering	475	500
Herefordshire, County of	493	500
Hertsmere	449	500
High Peak	505	500
Hillingdon	490	500
Hinckley and Bosworth	508	500
Horsham	511	500
Hounslow	538	500
Huntingdonshire	487	500
Hyndburn	494	500
Ipswich	508	500
Isle of Wight	502	500
Isles of Scilly	194	200
Islington	525	500
Kensington and Chelsea	502	500
Kettering	532	500
Kings Lynn and West Norfolk	489	500
Kingston upon Hull, City of	487	500
Kingston upon Thames	478	500
Kirklees	486	500

LA	Achieved	Target
Knowsley	467	500
Lambeth	526	500
Lancaster	497	500
Leeds	2060	2000
Leicester	515	500
Lewes	499	500
Lewisham	491	500
Lichfield	511	500
Lincoln	500	500
Liverpool	1988	2000
Luton	503	500
Maidstone	500	500
Maldon	506	500
Malvern Hills	502	500
Manchester	1986	2000
Mansfield	492	500
Medway	482	500
Melton	514	500
Mendip	540	500
Merton	491	500
Mid Devon	513	500
Mid Suffolk	503	500
Mid Sussex	492	500
Middlesbrough	496	500
Milton Keynes	556	500
Mole Valley	492	500
New Forest	486	500
Newark and Sherwood	479	500
Newcastle upon Tyne	2036	2000
Newcastle-under-Lyme	526	500
Newham	503	500
North Devon	502	500
North East Derbyshire	490	500
North East Lincolnshire	498	500
North Hertfordshire	496	500
North Kesteven	497	500
North Lincolnshire	497	500

LA	Achieved	Target
North Norfolk	514	500
North Somerset	471	500
North Tyneside	502	500
North Warwickshire	468	500
North West Leicestershire	469	500
Northampton	510	500
Northumberland	519	500
Norwich	512	500
Nottingham	2019	2000
Nuneaton and Bedworth	475	500
Oadby and Wigston	499	500
Oldham	995	1000
Oxford	503	500
Pendle	489	500
Peterborough	496	500
Plymouth	497	500
Portsmouth	494	500
Preston	499	500
Reading	515	500
Redbridge	509	500
Redcar and Cleveland	497	500
Redditch	495	500
Reigate and Banstead	490	500
Ribble Valley	504	500
Richmond upon Thames	497	500
Richmondshire	502	500
Rochdale	1018	1000
Rochford	496	500
Rossendale	495	500
Rother	514	500
Rotherham	488	500
Rugby	496	500
Runnymede	498	500
Rushcliffe	475	500
Rushmoor	503	500
Rutland	512	500
Ryedale	536	500

LA	Achieved	Target
Salford	1059	1000
Sandwell	532	500
Scarborough	522	500
Sedgemoor	481	500
Sefton	478	500
Selby	514	500
Sevenoaks	501	500
Sheffield	2014	2000
Shropshire	514	500
Slough	466	500
Solihull	493	500
Somerset West and Taunton	497	500
South Cambridgeshire	510	500
South Derbyshire	500	500
South Gloucestershire	480	500
South Hams	505	500
South Holland	498	500
South Kesteven	500	500
South Lakeland	488	500
South Norfolk	507	500
South Northamptonshire	506	500
South Oxfordshire	494	500
South Ribble	487	500
South Somerset	499	500
South Staffordshire	491	500
South Tyneside	491	500
Southampton	529	500
Southend-on-Sea	487	500
Southwark	495	500
Spelthorne	514	500
St Albans	497	500
St. Helens	486	500
Stafford	511	500
Staffordshire Moorlands	509	500
Stevenage	480	500
Stockport	1002	1000
Stockton-on-Tees	503	500

LA	Achieved	Target
Stoke-on-Trent	474	500
Stratford-on-Avon	516	500
Stroud	504	500
Sunderland	513	500
Surrey Heath	507	500
Sutton	532	500
Swale	451	500
Swindon	505	500
Tameside	1029	1000
Tamworth	501	500
Tandridge	488	500
Teignbridge	486	500
Telford and Wrekin	498	500
Tendring	520	500
Test Valley	493	500
Tewkesbury	501	500
Thanet	509	500
Three Rivers	500	500
Thurrock	495	500
Tonbridge and Malling	505	500
Torbay	523	500
Torridge	480	500
Tower Hamlets	486	500
Trafford	1009	1000
Tunbridge Wells	500	500
Uttlesford	480	500
Vale of White Horse	471	500
Wakefield	493	500
Walsall	535	500
Waltham Forest	505	500
Wandsworth	525	500
Warrington	487	500
Warwick	491	500
Watford	512	500
Waverley	492	500
Wealden	507	500
Wellingborough	532	500

LA	Achieved	Target
Welwyn Hatfield	488	500
West Berkshire	495	500
West Devon	506	500
West Lancashire	507	500
West Lindsey	496	500
West Oxfordshire	508	500
West Suffolk	497	500
Westminster	491	500
Wigan	1011	1000
Wiltshire	509	500
Winchester	540	500
Windsor and Maidenhead	493	500
Wirral	491	500
Woking	490	500
Wokingham	482	500
Wolverhampton	528	500
Worcester	520	500
Worthing	503	500
Wychavon	514	500
Wyre	473	500
Wyre Forest	498	500
York	523	500
TOTAL (314 Local Authorities)	177,273	176,950

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