

GRADUATE OUTCOMES SURVEY QUALITY REPORT (2ND EDITION)

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ABOUT THIS REPORT

Version 2.1.0

This report offers the most comprehensive current assessment of the strengths and weaknesses of the Graduate Outcomes data available currently, as well as providing information on any known specific quality issues. The primary audience is intended to be data analysts and other users who need more detailed information about the quality characteristics of the Graduate Outcomes data. It also forms part of an advanced user's guide to further information HESA has published on Graduate Outcomes, signposting technical specifications, papers, and reports of interest to analysts. The executive summary offers an overview of the contents, including a digest of the most important points.

We would once again like to express thanks to our many colleagues in the Data and Innovation Group, the Research and Insight, and Communications teams who contributed their time, expertise, and analysis to this report.

VERSION CONTROL

Table 1 - Version control

Version	Change description	Reviewer	Published date
v.1.0.0	First published version of the report	Lisa Walkley	2020-06-18
v.1.0.1	Minor edits to correct typographical errors	Dan Cook	N/A
v.2.0.0	Draft of the second published version of the report (year 2 data)	Multiple	N/A
v.2.1.0	Final draft of the second published version of the report (year 2 data)	Simon Kemp	2020-07-20

EXECUTIVE SUMMARY

Graduate Outcomes is a national survey, now in its second year of publication, of students completing courses of higher education (HE). It is conducted across the UK and seeks to survey the entire graduate population. It is the largest annual social survey in the country and is run by the Higher Education Statistics Agency (HESA) – a producer of official statistics. We aim to achieve National Statistics designation for the Graduate Outcomes outputs, and in March 2021, the Office for Statistics Regulation (OSR) noted a range of features that demonstrate the trustworthiness, quality, and value of the Graduate Outcomes statistics and which may support our eventual application for National Statistics designation.¹ In this second year of publication from the survey, however, we continue to badge our outputs as ‘experimental statistics’. Experimental statistics are newly developed or innovative official statistics undergoing evaluation. They are published with the aim of involving users and stakeholders in the assessment of their suitability and quality.

Users should exercise caution when using data from experimental statistics and evaluate the quality and coverage of any data they intend to use in the context of the intended application to ensure that it is fit for their purpose. This quality report has been written to help analysts do just that. We are keen to hear what users think of the products. Contact our Official Statistics team (official.statistics@hesa.ac.uk or (0)1242 388 513 [option 2]) with feedback and suggestions.

Relevance

[For more on relevance, see section 3.1.](#)

Graduate Outcomes data has been designed to be **relevant** to a wide range of user needs. The data reflects what we know about the requirements of prospective and current students; graduate employers; the HE sector and its funders and regulators; national, devolved and local governments; the press; and civil society, to have access to an independent and trusted source of information about graduates. It covers longstanding areas of interest in the activities graduates are doing, including whether they are in work or further study, and what their job or course is about. The survey also collects newer data where respondents are asked to reflect on the experience of being a graduate, their subjective wellbeing, and offer information about the characteristics of self-employment.

Accuracy and reliability

[For more on accuracy and reliability, see section 3.2.](#)

The survey offers information sourced directly from graduates, and this report explores the extent to which this can be relied upon as **accurate**. While no social survey can offer the individual-level precision of an administrative data source, the scope of topics in Graduate Outcomes is much broader than such sources. Graduate Outcomes’ sample size and response rate is much larger than for other surveys. We have found the data to be representative of the population for most statistical purposes. Our decision not to weight the data during the first year of publication was based on rigorous research reviewed by our peers. We have since commissioned an external study to evaluate whether weighting should be applied during the second year. Our contractor has come to a similar conclusion to us, and hence we have determined that no weights will be required.

¹ Mark Pont to Jonathan Waller: Higher Education Graduate Outcomes Data. 2021.
<https://osr.statisticsauthority.gov.uk/correspondence/mark-pont-to-jonathan-waller-higher-education-graduate-outcomes-data/>

Table 2 - overall 2017/18 survey response rates by group (full responses)

Main target group	Target	2017/18 response rate	2018/19 response rate
UK domiciled, full-time	60%	52.3%	53.6%
UK domiciled, part-time	60%	48.7%	49.5%
Research funded	65%	58.0%	59.1%
EU domiciled	45%	46.1%	48.0%
Non-EU domiciled	25%	29.4%	31.0%

Many users wish to analyse sub-samples of data about graduates. Sample sizes are important when using disaggregated data. Analysts should consider the sample sizes, and any uncertainty that generates. HESA has published confidence intervals on key data tabulations to assist in understanding how **reliable** the data is. This quality report also explains sources of known or potential bias we have identified, to help analysts decide how they should use the data, safely. We offer specific advice around using the data for regional or sub-regional geographic analysis. We also describe our survey instrument and processing approach in detail. One such section explains the creation of occupational and industrial classifications, and our high confidence in what has been produced.

Timeliness and punctuality

[For more on timeliness and punctuality, see section 3.3.](#)

Through extensive consultation with users and stakeholders, the census week at 15 months after course completion was determined as the best point at which to balance the need to generate meaningful insights into career and other outcomes with the need to deliver good rates of survey response. One implication of this is that our statistics include those who went straight on to postgraduate studies after their bachelor's degree and who may only just have finished at time of survey. Depending on onward use it may not be appropriate or **timely** to compare those who have spent 15 months in the labour market with those just graduating from a further qualification and graduate responses to the survey may be driven more by the second qualification achieved. Our publications make filtering these individuals from the data easy to achieve. Given our decision to amend the publication date for the Statistical Bulletin, we also comment on the **punctuality** of production in this section.

Accessibility and clarity

[For more on accessibility and clarity, see section 3.4.](#)

The Graduate Outcomes data is designed to be **accessible**, and users can view the data on our website, and download our data to perform their own analysis and visualisations. Open data is released under a Creative Commons 4.0 CC-BY license. We are also making aggregate and disaggregated survey data available through our data processor, Jisc. To find out more about how Jisc data analytics can help you, see: www.jisc.ac.uk/data-and-analytics In addition we supply [microdata](#)

The data release is accompanied by a comprehensive range of supporting information. Besides this quality report, users can find a Survey methodology, coding manuals, reports, blogs, and detailed guidance on our website. There is a lot of information available, which can be daunting.

We provide **clear** access routes to this information from the publications themselves and for visitors navigating to our website. For more expert analytical and technical users of Graduate Outcomes data, we have developed a [user guide](#). The user guide has been designed to make navigating and accessing the large body of supporting information easier. We particularly welcome feedback on the approach we have taken to presenting the User Guide, to help us improve it.

Coherence and comparability

[For more on coherence and comparability, see section 3.5.](#)

Graduate Outcomes forms the newest member of a family of exceptionally rich information about the HE sector. It **coheres** with the HESA Student records (and other data about HE in further education (FE) settings) to which it can be linked. We have begun a study comparing information relating to further study activity collected from respondents to the Graduate Outcomes survey, with similar variables available within the Student records. This work remains underway at the time of writing and a summary of current progress is offered within section 3.5. Further detail will be published in due course, once this study has concluded.

The Graduate Outcomes survey from which this year's statistical releases have been derived was begun prior to the rise of the coronavirus in the UK and continued through November 2020. In light of the unprecedented context of this year's survey, we conducted a programme of research in Spring 2021 to determine the impact of the pandemic on the survey data, especially on whether the data is **comparable** over time. An overview of the results of that research can be found in section 3.5.3.2., and further detail can be found in the accompanying insight brief covering the impact of the Covid-19 pandemic on Graduate Outcomes 2018/19.²

Graduate Outcomes survey results can also be used in conjunction with other data HESA collects about HE providers, their staff, finances, estates, and interactions with business and society. This survey replaces the former Destinations of Leavers from Higher Education (DLHE) survey and differs from it significantly in a number of ways that are explored later in this report. Data and statistics drawn from these two surveys are not directly comparable. HESA advises all data users against attempting to directly compare data between Graduate Outcomes and DLHE. Any such comparisons are likely to generate highly questionable results that are open to misinterpretation.

The Graduate Outcomes survey offers a rich and regular source of information collected directly from graduates themselves, offering their perceptions of their outcomes to date, as well as factual information about the kind of work they are doing, their salary and contractual status, or their further study options. This presents a breadth and level of detail about graduate experiences unparalleled in any other data source. It offers context to the tax and benefits data at the core of the Longitudinal Educational Outcomes (LEO) data from the Department for Education. It also complements the Labour Force Survey (LFS) by shining a spotlight on recent graduates and their activities. Our future plans include assessing how **comparable** our data is with similar variables in these other data sources and over time. This will provide users further understanding of the **quality** of the Graduate Outcomes data, to increase **trust** in our data source and methods, and to demonstrate the **value** the survey offers to our understanding of society.

² See: <https://www.hesa.ac.uk/insight/20-07-2021/impact-covid-19-graduate-outcomes>

1. INTRODUCTION

As a producer of official statistics, HESA is under an obligation to demonstrate the quality of its statistical outputs. This obligation is both a formal one, inasmuch as it is specified in Section Q3 of the Code of Practice for Statistics³, and a more pragmatic one, inasmuch as, by demonstrating the quality of its outputs, we can provide our stakeholders with information which will support them in the use of our statistics.

Although year two of the Graduate Outcomes survey remains badged as experimental statistics, this is a category of official statistics, and the Code of Practice therefore applies just as clearly to this set of experimental statistics as it does to any of our other statistical outputs.⁴ We have therefore integrated the principles of the Code of Practice for Statistics into every stage of our work on the Graduate Outcomes survey.

HESA data is used by a wide variety of stakeholders, and their need for high quality data provides us with further motivation for demonstrating the quality of our statistical products. Data from the former Destinations of Leavers from Higher Education (DLHE) survey, the forerunner of the Graduate Outcomes survey, was used not only by HE providers and prospective students, but also by a wide range of policy makers, researchers, and media outlets, and it will be important for Graduate Outcomes to continue to meet the needs of this same varied group of stakeholders.

As part of the review which led to the creation of the Graduate Outcomes survey, HESA conducted a quality assurance self-assessment of DLHE.⁵ This self-assessment found that, while some aspects of DLHE achieved the highest level of quality assurance, other aspects did not meet the same standard, and that the survey as a whole therefore did not meet the desired level of quality assurance. The self-assessment concluded with a list of quality assurance recommendations for the successor to DLHE, including:

- Centralizing the administration of the survey
- Developing a robust methodological architecture
- Enhancing HESA's investigations of quality features and publishing the results of those investigations
- Gathering feedback from users about the quality of the data.

As well as allowing us to make a more general determination of the quality of the Graduate Outcomes outputs, this report gives us an opportunity to demonstrate the progress HESA has made towards addressing those recommendations, not only in the design and implementation of the new Graduate Outcomes survey, but also during the review of the Graduate Outcomes survey which was initiated after the first year of publication.

³ UK Statistics Authority. Code of Practice for Statistics. <https://code.statisticsauthority.gov.uk/wp-content/uploads/2018/02/Code-of-Practice-for-Statistics.pdf>

⁴ See our blog post on this issue for more details <https://www.hesa.ac.uk/blog/18-03-2020/true-method-knowledge-experiment-why-graduate-outcomes-statistics-are-experimental>

⁵ See https://www.hesa.ac.uk/files/Quality_assurance_self_assessment.pdf

2. QUALITY METHODOLOGY

HESA builds the Code of Practice for Statistics into all aspects of its work. At HESA, quality management is an overarching practice that is prioritised in each part of the statistical business process. We operate appropriate quality regimes for each aspect of our work, and although delayed by the pandemic, we are committed to bringing these practices together in a single overarching quality policy. For this quality report, we have taken the following approach.

First, we base our approach on the guidance offered by the National Statistician on survey quality measurement, by structuring our report around the five dimensions of quality outlined in the European Statistical System.⁶

Second, we have already created a range of supporting materials, now organised into a single [user guide](#), including a Survey methodology,⁷ which covers our dissemination policy for Graduate Outcomes. These materials are cross-referenced as needed in this quality report, as they form part of the evidence base for it. Sometimes, for ease of reading, there will be some repetition between this report and others we have published, though we have attempted to keep this to a minimum. Our stated intention was to bring these several resources together in a single user guide for the Graduate Outcomes survey; a goal endorsed by the Office for Statistics Regulation (OSR) in their assessment of the first year of Graduate Outcomes against the Code of Practice for Statistics.⁸ We are therefore pleased to present this second edition of the quality report as an integrated section of the new user guide. We are keen to get users' feedback on the user guide, as we expect to develop the approach further in coming years.

Third, our aim and purpose in writing this report is to offer the most up-to-date assessment of the quality characteristics of the Graduate Outcomes survey. In doing so, we have necessarily prioritised our own uses and outputs first, as these take into account the many user requirements we have already elicited. However, at this relatively early stage in the Graduate Outcomes survey's development, a quality report cannot be as comprehensive as one that follows a period of extensive usage by other users. Notably, our own initial uses are mainly for the release of aggregated data, which is filterable by multiple characteristics, but ultimately still a summary of findings. We encourage users of survey microdata to carry out and publish their own quality assessments, especially in areas where our own work does not provide them with the understanding they need to have confidence in the validity of their analysis. This approach will extend and enhance our own work, for the benefit of all users.

Fourth, although this is a technical report about statistics, it follows a narrative format. Our assessments and evaluations of quality characteristics are presented using a predominantly narrative approach, with tabular information included as static data tables to illustrate our findings.

⁶ UK Statistics Authority. 2013. *Guidelines for Measuring Statistical Output Quality*.
<https://webarchive.nationalarchives.gov.uk/20160106063521/http://www.ons.gov.uk/ons/guide-method/method-quality/quality/guidelines-for-measuring-statistical-quality/guidelines-for-measuring-statistical-output-quality.pdf>

European Statistical System Committee. 2017. *European Statistics Code of Practice*.
<https://ec.europa.eu/eurostat/documents/4031688/8971242/KS-02-18-142-EN-N.pdf/e7f85f07-91db-4312-8118-f729c75878c7>

⁷ Available from: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology>

⁸ Mark Pont to Jonathan Waller: Higher Education Graduate Outcomes Data. 2021.
<https://osr.statisticsauthority.gov.uk/correspondence/mark-pont-to-jonathan-waller-higher-education-graduate-outcomes-data/>

3. QUALITY DESCRIPTION

The following subsections detail our assessment of the quality of the survey.

We will be assessing the quality of the survey according to the five dimensions of quality specified in the European Statistical System. These are:

- Relevance
- Accuracy and reliability
- Timeliness and punctuality
- Accessibility and clarity
- Coherence and comparability.

These dimensions, which are recommended for use in measuring survey quality in the National Statistician's guidance, also map onto aspects of quality which must be assured according to section Q3 of the Code of Practice for Statistics. The following sections of this quality report therefore cover each of the dimensions in turn, exploring the quality characteristics of the Graduate Outcomes survey by utilising the relevant quality indicators and measures identified in the guidance.

3.1. RELEVANCE

When considered as a dimension of statistical quality, relevance refers to the extent to which statistical outputs meet the current and potential needs of users. In order to assess relevance, it is necessary first to identify likely users of the data and their needs. The data sources and statistical concepts used in the production of a statistical output are also a factor in determining relevance; depending on user needs, different data sources and classification schemes will be appropriate. Finally, it is important to identify any gaps between the statistical output and known user needs and to assess how those gaps may be filled in future.

3.1.1. USERS AND USER NEEDS

A wide variety of users, in the HE sector and beyond, work with HESA data on graduates. HESA has obligations to a range of statutory customers in all four UK nations, including the funding and regulatory bodies for higher education in each nation; our statutory obligations to these customers require us to provide them with the data which they need to carry out their public functions.⁹ As Designated Data Body for England, HESA is further required by law to publish 'appropriate information relating to registered HE providers and the higher education courses they provide'. According to the Higher Education and Research Act 2017 (HERA), the category of 'appropriate information' includes information which may be helpful to students in higher education, potential higher education students, and HE providers; HERA also specifies that the designated data body must provide appropriate information to the Office for Students (OfS), UK Research and Innovation (UKRI), and the Secretary of State for Education.¹⁰ In addition to those users whose needs we are required by law to consider, we also wish to consider the needs of others for whom high quality data on graduates will be useful, including HE funding and regulatory bodies, local and national governmental agencies, graduate employers, and academic researchers.¹¹

Different users have different needs for the Graduate Outcomes data. Prospective HE students may look to Graduate Outcomes in order to make informed choices about providers and courses, while HE providers may use the data for strategic planning purposes. Funding and regulatory bodies may use Graduate Outcomes data to assess the performance of providers and courses, while government agencies—both local and national—and graduate employers may look to the data to provide information both about the regional supply of graduates with different skills and about the roles played by graduates in society more generally. Since the publication of the first statistical outputs based on the survey, HESA has tracked citations of Graduate Outcomes data, and seen it used a variety of publications, from stories on higher education in the national media, to publications designed to support student choice, to analyses conducted by funding and regulatory bodies.¹²

⁹ A list of the statutory customers who require data from HESA can be found at <https://www.hesa.ac.uk/about/what-we-do/statutory-customers>

¹⁰ Higher Education and Research Act 2017, sections 64 and 65.
<http://www.legislation.gov.uk/ukpga/2017/29/section/65/enacted>

¹¹ A list of likely users of graduate outcomes data, based on known users of the DLHE survey, can be found in the Graduate Outcomes Survey methodology: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/understanding-outcomes>

¹² See, for example, a recent BBC article on graduates leaving Wales (<https://www.bbc.co.uk/news/uk-wales-57528943>), the 2020/21 'What do graduates do?' report from Prospects (<https://luminare.prospects.ac.uk/what-do-graduates-do/>), and the experimental 'Proceed' measure published by the Office for Students in May 2021 (<https://www.officeforstudents.org.uk/publications/proceed-updated-methodology-and-results/>).

Throughout the design and implementation phases of the Graduate Outcomes survey, HESA has been engaging with the various potential users of the survey data, actively. In the early stages of the NewDLHE review, a Strategic Group and a Working Group were convened; these groups, which were comprised of representatives from a wide variety of HE providers and other sector bodies, were responsible for setting the remit for the review and developing a workplan to pursue this remit.¹³ Later in the review, HESA carried out two consultations, the first to determine user needs for the successor to DLHE, and the second to solicit feedback on the draft model for the new survey.¹⁴

Responses to the second consultation suggested a high level of stakeholder approval for the proposed model, giving HESA a mandate from potential survey users to proceed with the implementation of the new survey. The model proposed in the second consultation called for the establishment of the Graduate Outcomes Steering Group; this group, like the earlier Strategic and Working Groups, is designed to reflect the diversity of stakeholders for the Graduate Outcomes survey and is comprised of representatives from HE providers and HESA statutory customers from across the UK. The Steering Group met quarterly during the development and implementation of the survey to advise HESA on all aspects the Graduate Outcomes survey. HESA values the expertise and input which has so far been contributed by the Graduate Outcomes Steering Group, and it is envisaged that the group will continue to operate in an oversight capacity and to help guide further improvements to the survey.¹⁵

In addition to the regular meetings of the Graduate Outcomes Steering Group, HESA continues to solicit feedback from the sector on particular issues. While the charts and tables to be included in the first Graduate Outcomes Statistical Bulletin and open data release were being developed from conceptual designs into logical wireframes, HESA convened a group of sector representatives to ascertain whether the planned outputs met with user needs. This engagement with stakeholders informed the initial publication of Graduate Outcomes data, and has continued to guide our decision-making process as we prepared for the second year of outputs. for the second year of outputs.¹⁶ Over the course of the second year of surveying, HESA has invited key users to participate in a review of the survey questionnaire, and has also continued to consider user feedback about the survey and its associated outputs submitted to the Agency via other channels.¹⁷

¹³ The NewDLHE review was a major review of HESA's destinations and outcomes data which ran from July 2015 to June 2017; 'NewDLHE' was the working title for replacement for DLHE, which has since become the Graduate Outcomes survey. For a complete record of the review, see

<https://www.hesa.ac.uk/innovation/records/reviews/newdlhe>

Further detailed information on the NewDLHE Working Group and Steering Group can be found on the

HESA website: <https://www.hesa.ac.uk/innovation/records/reviews/newdlhe/working-group>

<https://www.hesa.ac.uk/innovation/records/reviews/newdlhe/strategic-group>

¹⁴ Syntheses of responses to the two consultations can likewise be found on the HESA website:

<https://www.hesa.ac.uk/innovation/records/reviews/newdlhe/consultation>

<https://www.hesa.ac.uk/innovation/records/reviews/newdlhe/second-consultation>

¹⁵ Further information on the remit and composition of the Graduate Outcomes Steering Group:

<https://www.hesa.ac.uk/innovation/outcomes/about/steering-group>

¹⁶ HESA. 2020. How to publish Graduate Outcomes data? Our consultation on open data release.

<https://www.hesa.ac.uk/blog/15-04-2020/how-publish-graduate-outcomes-data>

¹⁷ Users can submit feedback to the Official Statistics, Liaison, and Communications teams; they can also provide feedback on the HESA website, or direct queries to Jisc, HESA's data analytics partner.

3.1.2. DATA AND STATISTICAL CONCEPTS

The Graduate Outcomes survey covers all graduates who obtain relevant higher education qualifications during the survey year. The list of graduates who are eligible to be surveyed is generated on the basis of data on qualifiers from the Student and Alternative provider student record along with data from the further education sector supplied by the Department for the Economy, Northern Ireland (DfENI) and the Office for Students (OfS). HE providers and Welsh and Northern Irish further education colleges are then responsible for supplying HESA with valid contact details for their graduates. While the OfS can provide HESA with contact details for graduates of English further education colleges, colleges whose contact details are provided by the OfS can subsequently amend the contact details for their graduates as required.¹⁸

Graduates are divided into four cohorts, based on the time of year at which they obtained their qualification, and they are surveyed, either online or by telephone, approximately 15 months after the completion of their studies.¹⁹ Graduates are asked to respond to the survey with reference to a seven-day census week at the beginning of the sampling period; graduates in cohort A, for example, finished their qualifications in August to October 2018, and were surveyed in December 2019 to February 2020, with reference to the first week of December 2019.²⁰ Approximately 21% of graduates were surveyed as part of cohort A (having qualified from August to October 2018); 5% were surveyed as part of cohort B (having qualified from November 2018 to January 2019); 4% were surveyed as part of cohort C (having qualified from February to April 2019); and the remaining 69% were surveyed as part of cohort D (having qualified from May to July 2019). All four cohorts are analysed together to produce a single annual dataset, reflecting the fact that most UK higher education operates on a relatively standardised academic year, and the majority of graduates therefore finish their qualifications in early summer (cohort D). The division of the survey year into four cohorts primarily aids data collection and ensures a consistent 15-month gap between course completion and census week.

Graduate activities are one of the main areas of interest in the survey. Graduates are given a list of potential activities and are asked to select all activities from that list which they were undertaking during census week. The following options are available:

- Paid work for an employer²¹
- Self-employment/freelancing
- Running my own business
- Developing a creative, artistic or professional portfolio
- Voluntary/unpaid work for an employer
- Engaged in a course of study, training or research
- Taking time out to travel – this does not include short-term holidays
- Caring for someone (unpaid)
- Retired

¹⁸ Graduate Outcomes Survey Results record 2018/19 - Coverage of the record.

<https://www.hesa.ac.uk/collection/c18072/coverage>

¹⁹ For further details on the sources of the Graduate Outcomes data, see the relevant section of the Graduate Outcomes Survey methodology: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/survey-coverage>

²⁰ For further detail on cohort and census dates, see the Graduate Outcomes Definitions page on the HESA website: <https://www.hesa.ac.uk/support/definitions/graduates>

²¹ From Cohort C of the 2018/19 survey, additional guidance was added instructing graduates who had been furloughed under the Coronavirus Job Retention Scheme to report themselves as undertaking paid work for an employer.

- Unemployed and looking for work
- Doing something else.

From the list of activities which they select, graduates are additionally asked to identify the activity which they consider to have been their most important activity during census week. On the basis of the activities which they select, graduates are routed to subsequent survey questions; the order in which they are routed depends on which activity they identify as most important.

Graduate employment is a key area of interest for many users of HESA data on graduates; the most recent version of the Teaching Excellence and Student Outcomes Framework (TEF), for example, makes use of DLHE data on the percentage of graduates from a given provider who are in full-time professional level employment or further study six months after finishing their qualification.²² Responses to the graduate activity question in the Graduate Outcomes survey are therefore likely to be an important source of information about graduates in work or employment 15 months after course completion.²³ In HESA's analysis of the data, we compile tables that look at graduates in work; for some of these tables we include both those working for an employer and those who are self-employed, running their own business and developing portfolios, while for others we include only those in a certain type of work (e.g., 'work for an employer'). We provide a 'work type marker' filter for tables which cover all graduates in work, to allow users to distinguish between respondents in paid employment, those who are self-employed or running their own businesses, and those in voluntary work. We also provide a 'work population marker' to relevant tables which allows users to view data either based on all graduates who report one or more of these activities, or alternatively to focus on those graduates who state that one of these activities is their most important activity.

Graduates who are engaged in work for an employer (whether paid or unpaid), self-employment, or running their own business, are assigned both a Standard Industrial Classification (SIC) code and a Standard Occupational Classification (SOC) code. Graduates developing a portfolio are assigned a SOC code only. Accurate SIC and SOC coding makes it possible both to provide users with a clear picture of the industries and occupations in which higher education graduates are working and to allow users to compare the outcomes experienced by graduates working in different areas.

The SIC framework categorises businesses in terms of the type of economic activity in which they are engaged.²⁴ Easily comparable data on the industries in which graduates are working helps users to understand the economic contributions made by higher education graduates.

²² Office for Students. TEF data. <https://www.officeforstudents.org.uk/advice-and-guidance/teaching/tef-data/> For further detail, see the 'Employment metrics' section of the Year 4 TEF technical specification:

https://www.officeforstudents.org.uk/media/da96d15a-97e6-4732-a2f5-cb2473633932/ofs2018_45.pdf

For TEF purposes, employment counts as 'professional level' if the occupation in question has a SOC code in major groups 1-3; see below for HESA's approach to SOC coding (more information is covered in this section, and further information is available below, in section 3.2.9.2. SIC and SOC coding).

²³ For more detail on the definitions of work and employment used by HESA, see section 3.5.1. National and international data standards below.

Future action for HESA to consider includes evaluation of the potential gap between HESA and harmonised national definitions, both through comparison with third-party linked data sources such as LEO/LFS and through evaluation of question wording in the light of this.

²⁴ Further detail about HESA's use of the SIC coding framework can be found in section 3.5.1. National and international data standards below.

Whereas SIC data provides information about the sectors of the economy in which graduates are active, the SOC framework provides a system for categorising occupations according to the skill level and type of work entailed by the jobs which graduates do.²⁵

SOC codes allow jobs to be categorised, in order of increasing specificity, according to major groups, sub-major groups, minor groups, and unit groups; major groups are distinguished by the level of skill and experience required to perform the activities associated with a job, while occupations within each major group are organised according to the type of work performed. In line with the methodology adopted by the Office for National Statistics and the Department for Education, occupations are classified according to their SOC major group as 'high skilled' (groups 1-3), 'medium skilled' (groups 4-6), or 'low skilled' (groups 7-9) for purposes of analysis. These classifications by SOC major group are particularly valuable to users who wish to see a broad overview of the kinds of jobs done by graduates or to compare the employment outcomes of graduates with different characteristics.

In addition to asking graduates about their activities during census week, the survey asks graduates two sets of questions about how they feel. In the first set of these questions, the 'graduate voice' questions, graduates are asked to reflect upon their activities, and to consider the extent to which those activities fit with their future plans, are meaningful, and allow them to utilise what they learned during their studies. These questions were designed by HESA in response to feedback from sector representatives, who felt that there was a need for qualitative data linking graduates' current experiences with their experiences in HE.²⁶ Graduates in work are asked these questions with reference to their work, graduates in further study are asked these questions with reference to their current study, and graduates doing something else or engaged in multiple activities are asked these questions with reference to their current activities.²⁷ Given current policy interest in employment quality, HESA is currently undertaking work on the development of a composite variable, based on the graduate voice questions, which will help users assess the quality of the jobs held by graduates in work; an initial report on the rationale behind the development of this variable and the proposed methodology was published in June 2021, and a programme of user engagement is currently planned in order to determine how the new measure might be used in statistical outputs.²⁸

The second set of questions deals with graduates' subjective wellbeing (SWB). SWB is assessed in Graduate Outcomes using a set of four questions (the ONS4), which were developed by the Office for National Statistics (ONS) for use in the Annual Population Survey and have since been used in a large number of social surveys; prior to their use in Graduate Outcomes, the ONS4 were included in the final year of the LDLHE (Longitudinal Destinations of Leavers from Higher Education) survey.²⁹ In the ONS4, graduates are asked to think about the extent to which they:

- are satisfied with their life
- feel that the things they do are worthwhile

²⁵ For further detail about HESA's use of the nationally recognised SOC framework, see section 3.5.1. National and international data standards below.

²⁶ For more detail about the development of the graduate reflection questions, see the Graduate Outcomes Survey methodology: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/review-topics>

²⁷ Further discussion of the routing of these questions can be found in section 3.2.6.2.1 below.

²⁸ See: <https://www.hesa.ac.uk/files/Graduate-Outcomes-statistical-measure-design-nature-of-work-20210608.pdf>

²⁹ ONS. 2018. *Personal well-being user guidance*.

<https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/methodologies/personalwellbeingsurveyuserguide>

- feel happy
- feel anxious.

Like the ‘graduate voice’ questions, the section on SWB was added to the Graduate Outcomes survey as an alternative outcome measure, separate from employment and employability. Several possible alternative outcome measures were proposed during the first consultation phase, and the ONS4 SWB questions were added to the core Graduate Outcomes survey in response to feedback from HESA’s statutory customers..³⁰

Finally, the Graduate Outcomes survey includes a number of opt-in question banks, which may be asked after respondents have come to the end of the core survey. Providers are given the option to select a number of additional question banks which will be asked of their graduates. Some of the opt-in question banks are targeted at certain categories of graduates and will therefore not be asked of all graduates from a provider.

The following opt-in question banks are available, depending on the data needs of providers:

- Finding your job
- Net promoter entity
- Graduate choice
- Research students
- Newly qualified teachers
- Careers service.

The addition of these opt-in banks gives providers some scope to tailor the survey to their particular data needs; a provider with a particular desire for data on graduate satisfaction might want its graduates to answer the ‘net promoter’ question bank, while a provider interested in the effectiveness of its career services provision might want to ask its graduates how they found their current jobs.

3.1.3. ASSESSMENT OF GAPS

The Graduate Outcomes survey was designed, as far as possible, to meet likely user needs for data on what graduates do after finishing HE and how they feel about their careers so far. We maintain a watching brief on policy issues that are of relevance to data about graduate outcomes, and report internally on emerging trends. Since the development of this survey was an extended project, however, there may be some gaps between our outputs and user needs. This could be because needs are changing faster than the survey development process, or because there are trends of which HESA is not yet aware. Since the publication of the first year of Graduate Outcomes data, we have been soliciting further feedback from users of the data via a variety of channels, including collecting feedback submitted via the website and conducting an extensive programme of sector engagement, in order to assess how well the initial publication has met user needs. As we collect user feedback, we aim to incorporate it, as appropriate, into any adjustments we make to the survey and resulting statistical outputs. Our approach to evaluation is covered in the Survey methodology..³¹

³⁰ For further information on review of alternative outcomes measures, see the relevant section of the Graduate Outcomes Survey methodology: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/review-topics>

³¹ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/evaluation>

HESA is already aware of some areas in which we are working to make improvements in the data which we collect and publish. Regional employment and skills gaps are important areas of current policy interest; in the spring 2020 budget speech, the government emphasised a policy of 'levelling up' across the UK, aimed at providing opportunities in under-served regions and reducing regional disparities, and a recent OfS initiative offered grants to universities to work with local employers to develop graduate jobs.³² While the Graduate Outcomes survey collects data on location of domicile, HE provider, and place of work (for those graduates in work), the year one statistical outputs for the survey analysed graduate outcomes only by country of provider and in some cases domicile; the year two data provides more granular geographic detail, including analysis of place of work at the level of Government Office region.³³ For the second year of Graduate Outcomes publications, we have in addition carried out a review of the base population used for response rates (so as to include for the sake of consistency all seriously ill or deceased graduates) and the salary outlier thresholds.

Additionally, the ongoing data collection process continues to bring to light areas in which adjustments to the survey questionnaire have the potential to improve data quality and our ability to produce outputs which meet user needs. Significant changes to the survey questionnaire require approval from the Graduate Outcomes Steering Group; as we continue to assess the survey and integrate feedback from users, HESA will continue proposing changes to the Steering Group wherever it seems that modifications will enable us to produce data which better serves the needs of our stakeholders. At the end of 2020 we commenced an extensive review of Graduate Outcomes, aimed at identifying improvements to various aspects of the survey such as data collection instruments and survey methodology. As part of this we are currently reviewing the survey questionnaire with the aim of re-establishing data requirements of our users by making sure questions in the survey are still fit for purpose and reducing respondent burden by removing redundant questions. Several changes have already been identified as a result and they will be confirmed over the coming months and implemented in the next collection, i.e., 2020/21.

During the second year of surveying, we also considered the impact of Covid-19 on both survey operations and the instruments themselves.³⁴ On 19 May 2020, we issued an update explaining the issues we had considered and the decisions we had come to with respect to the pandemic.³⁵ Our focus was on ensuring that graduates could self-administer the survey to accurately reflect their personal situation and that interviewers could support participants sensitively and appropriately. We added a clarification to the list of graduate activities to clarify that furloughed employees should still identify themselves as undertaking paid work for an employer. We also added supportive text to the survey (both on the online and CATI version) signposting participants to mental health and wellbeing organisations across the world (the Samaritans, Befrienders Worldwide and Mind). We also identified other areas where the impact of the pandemic would need to be taken into account either in outputs (as was the case for salary, which is covered in section 3.2.8 of this report, on the

³² Rishi Sunak. Budget Speech 2020. 11 March 2020. <https://www.gov.uk/government/speeches/budget-speech-2020>

OfS. 2020. *No place like home – new fund to boost local graduate opportunities.*

<https://www.officeforstudents.org.uk/news-blog-and-events/press-and-media/no-place-like-home/>

³³ See section 3.2.9.4 below for discussion of the work which has been done to improve the quality of data on location of work.

³⁴ Further detail on the impact of the Covid-19 pandemic on the 2018/19 Graduate Outcomes data can be found in section 3.5.3.2 of this report, and in the accompanying insight brief:

<https://www.hesa.ac.uk/insight/20-07-2021/impact-covid-19-graduate-outcomes>

³⁵ For information on our assessment of gaps as a result of the Covid-19 pandemic, see:

<https://www.hesa.ac.uk/news/coronavirus#acc1>

handling of sensitive data) or in the future design of the survey (in particular questions about the location of work, since working locations have been impacted so significantly for many workers). These latter issues have been taken forward in the survey review activity currently being conducted by the Steering Group supported by HESA.

3.2. ACCURACY AND RELIABILITY

In this section we evaluate the closeness between the estimated results produced from the survey and the (unknown) true value. The design of Graduate Outcomes minimises the possibility for sampling error, due to the comprehensive approach taken to surveying all cases available to be contacted from the sampling frame. We therefore start by describing the sampling frame, and how we maintain it, also describing the close resemblance of the sample to the sampling frame. We then go on to concentrate on various forms of non-sampling error in the subsequent subsections, including:

- coverage error
- non-response error
- measurement error
- processing error.

3.2.1. THE SAMPLING FRAME, AND HOW IT IS MAINTAINED

The Graduate Outcomes survey aims to survey the population of graduates from Higher Education (HE), and the survey employs a dynamic sampling frame that is kept up to date when source data changes. The source data is a list of data about individual graduates drawn from existing administrative census datasets about students. These sources are enriched with contact details sourced from the providers where those graduates studied. Below, we cover these two separate aspects of how the sampling frame is constructed. The Survey methodology section on the sampling frame offers an overview of this area.³⁶ We present additional information in the following paragraphs.

The sampling frame has been developed utilising the main administrative data sources for HE provision in HE settings across the UK,³⁷ and for college HE in all parts of the UK except Scotland.³⁸ These data sources each support existing official statistics publications, so our initial assumption is that they are of high quality and fit for their purposes. The sampling frame is drawn from this administrative data, according to the criteria set out in the coverage statement for the Graduate Outcomes Contact Details record³⁹ which we summarise in the Survey methodology section on survey coverage.⁴⁰ The (separate) coverage statement for the Graduate Outcomes Survey Results record explains further detail of this.⁴¹ The following subsection summarises this information, and provides additional commentary, starting with the main processes utilised for all data sourced from HE providers, by HESA. In the subsection after that, we cover how we derive the sampling frame related to college HE settings.

3.2.1.1. Sampling frame data based on HESA data collections

The majority of data used to determine the sampling frame is collected by HESA. HESA collects individualised data on students in HE providers across the whole UK in its Student record and Student Alternative record (referred to hereinafter as the “Student record(s)”, for brevity). Data from these records is an administrative census: their goal is to enumerate the HE student population

³⁶ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/sampling-frame>

³⁷ These are the HESA Student record(s) described in detail further on. See <https://www.hesa.ac.uk/data-and-analysis/students> for the data published from these records.

³⁸ The detail is covered later on, in section 3.2.1.2. Sampling frame data based on other ingested data.

³⁹ See <https://www.hesa.ac.uk/collection/c18071/coverage>

⁴⁰ For further information about the survey coverage, see the relevant section in the Survey methodology: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/survey-coverage>

⁴¹ See <https://www.hesa.ac.uk/collection/c18072/coverage>

and describe their personal and study characteristics. The data on qualifiers contained in the Student records is the most complete single record of graduates from HE available. The Student records are the primary official record of UK HE, and are principally collected on behalf of the UK Government, the Devolved Administrations, and the Office for Students.⁴² HESA collects this data annually, from a constituency of HE providers that is refreshed at least annually – referred to by HESA as ‘reporting providers’. This covers all publicly-funded and/or regulated HE providers in the UK. The HESA Student records for the 2018/19 academic year were used in the creation of the sampling frame for the second year of the Graduate Outcomes survey.

The sampling frame comprises all students reported to HESA or the relevant body as obtaining relevant higher education qualifications during the reporting period 01 August to 31 July, and whose study was full-time or part-time (including sandwich students and those writing-up theses). Graduates with awards from dormant status are only included in the target population for postgraduate research students. Graduates with some qualifications are excluded from the sampling frame, principally because their work and study destinations are already captured by other data sources. These include intercalated degrees, awards to visiting students, students on post-registration health and social care courses, and professional qualifications for serving school teachers.⁴³

Exceptionally, issues may be found in the source administrative data, that, when corrected through the data amendments process (also termed the fixed database facility) have the effect of altering the sampling frame.⁴⁴ Up to the dates specified in the coding manual (which overlap with the contact period substantially) changes made to the sampling frame *via* the fixed database are reflected in the “population file” that is passed to the provider through an online electronic portal for providers (hereinafter, ‘the Portal’), so that additional contact details can be gathered. This would be necessary, for example, if the fixed database change increases the sampling frame data for a provider, by inserting previously missing records. Furthermore, the data that is published (including response rates in relation to targets) always reflects the most up-to-date sampling frame available from the fixed database at the time of production. This means that even if over-sampling has occurred (because a fixed database change removes graduates from the sampling frame, in cases where responses have already been gathered, successfully) then these results would also be discarded from the output file.

In order to derive the sample, and to obtain their contact details, information about the sampling frame is passed back to the HE providers, through the Portal. The goal is to maximise the availability of usable contact details for use during data collection. A full data collection process exists to support this activity, and it is specified in detail in the coding manual for the Graduate Outcomes Contact Details record.⁴⁵ This document explains the collection schedule and the data items collected, and gives information to support interactions with graduates – an engagement

⁴² HESA’s Collection Notice for its Student record <https://www.hesa.ac.uk/about/regulation/data-protection/notices> details the statutory background for this. The coverage statement for the Student record (2018/19) utilised in creating the sampling frame gives details on which students are included in the record: <https://www.hesa.ac.uk/collection/c18051/coverage>. The equivalent statement for the Student Alternative record is here: <https://www.hesa.ac.uk/collection/c18054/coverage>

⁴³ Full details of exclusions are available at: <https://www.hesa.ac.uk/collection/c18072/coverage#contents5>

⁴⁴ For details of the financial impact and regulatory authorisation needed to make a change to the previously-submitted data (to amend the fixed database) see <https://www.hesa.ac.uk/support/provider-info/subscription/fees-and-charges>

⁴⁵ See <https://www.hesa.ac.uk/collection/c18071>

strategy is defined by HESA and roles and responsibilities are shared with HE providers.⁴⁶ The coding manual also gives details of the quality assurance regime (automated and manual) along with other guidance and training materials on the systems and processes operated *via* the Graduate Outcomes provider portal.

In the provider portal, providers are presented with an output file showing graduates from the sampling frame drawn from the providers' own data (collected previously) and are asked to populate and upload an XML file with contact details. Detailed guidance and training is offered on data quality expectations and using the tools provided.⁴⁷ The provider portal enables HE providers to act as peers in the quality assurance process, and HESA's system logs show interaction with the Portal has reduced as providers normalise their use of the tool following initial teething/experimentation. This complements increased use of the web-based update facility (mainly used by smaller providers).

Table 3 Portal usage statistics

Year of survey	Providers attempting upload	File uploads attempted	Providers successfully uploading files	Successful file uploads
First year (17071)	190	5,437	176	1,462
Second year (18071)	193	3,448	181	1,259

On submission, checks are undertaken by HESA to identify any problems with various quality dimensions of the data:⁴⁸ validity,⁴⁹ uniqueness,⁵⁰ completeness,⁵¹ and consistency.⁵² Further information about the 51 automated rules applied consistently during the second year of operation is available online in the quality rules directory.⁵³ While new rules can be added in response to feedback from survey operations, no changes were required during the second year of operation. Version control is applied to all aspects of the coding manual and quality rules, allowing analysts to see which rules were introduced at which points.

The quality regime seeks to maximise the number of usable details available for contact. Where quality rules are triggered, providers must either update the data, or contact HESA to request that the rule be 'switched-off' for that observation. This process is managed by HESA's Liaison team who have oversight of these operational data quality issues. We do not directly assess the

⁴⁶ This engagement plan is detailed in the information provided on the operational management of the survey. See <https://www.hesa.ac.uk/definitions/operational-survey-information#engagement-plan>
Communications resources are here:

<https://www.hesa.ac.uk/innovation/outcomes/providers/communications>

Roles and responsibilities are here: <https://www.hesa.ac.uk/innovation/outcomes/providers/responsibilities>

⁴⁷ See https://www.hesa.ac.uk/collection/c18071/contact_details_guidance for an accessible overview. For full information about types of contact details we accept and other best practice see the Portal user guide, at: https://www.hesa.ac.uk/collection/c18071/portal_user_guide

⁴⁸ HESA's approach to data quality management during collection rests partly on the quality dimensions specified in the DAMA DMBOK. See (DAMA UK Working Group on "Data Quality Dimensions", 2013) (For outputs, HESA uses the ESS dimensions.)

⁴⁹ E.g. telephone numbers consist of digits.

⁵⁰ E.g. identifying graduates with duplicate email addresses or telephone numbers.

⁵¹ E.g. that most graduates in the sampling frame have some contact details.

⁵² E.g. that a variety of different contact methods have been given, and they are not all, for example, comprised entirely of the provider's own 'email for life' address (where this exists) for each graduate.

⁵³ See https://www.hesa.ac.uk/collection/c18071/quality_rules

accuracy⁵⁴ of the contact details – our current checks do not determine if the contact details provided belong to the graduate. Providers must therefore warrant the accuracy of the data and fitness for purpose for use of the contact details, on submission. The head of the provider also affirms compliance with the (supply side) Code of Practice for Data Collection.⁵⁵ Providers' interactions with HESA also form part of their internal audit and compliance mechanisms, which are typically overseen by their governing bodies.

At this point, we will summarise the quality characteristics of the contact details. Quality of contact details is measured primarily in terms of coverage or completeness of record and validity. The following table demonstrates that coverage has largely remained constant between years 1 and 2 with a slight deterioration in the number of graduates without a phone number:

Table 4 Quality characteristics of contact details

Type of contact details	% with no contact details	% with email only	% with UK Landline or International number only	% with UK mobile but no email	% of grads with email and number
Year 1	0.2%	2.6%	0.2%	0.8%	95.9%
Year 2	0.2%	5.4%	0.3%	0.8%	93.3%

Throughout year two we have been reporting on the validity of contact details through the end-of-cohort review reports⁵⁶. Based on our evaluation of the quality of contact details over the past two years we recently published a blog aimed at providers with a view to highlight the most common issues and their impact on our ability to make contact with graduates and collect responses⁵⁷. This has led to the introduction of a series of internal checks which are regularly carried out on contact details and the feedback is shared directly with providers who have submitted relatively low-quality contact details compared to the rest of the sector. In practice, some contact details prove unavailable. A few graduates do not keep in touch with their HE providers and accurate contact details held for them can become out of date. Providers are encouraged to stay in touch with their graduates through different means, enabling them to supply good quality contact details in time for the survey 15 months later.

During the second year of the survey, the automated quality assurance of contact details has remained largely consistent with the approach established by the end of the first year of operations. The main additions to the process were guidance about the utilization of providers' own email addresses, the use of a postcode validator, and the implementation of a new functionality for monitoring the quality of mobile numbers used for SMS delivery. Details of the quality rules we utilized during construction of the elements of the sampling frame that are drawn from the HESA Student records is available within the quality rules directory in the coding manual.⁵⁸

During the contact details collection process, HE providers are also able to supply additional information that allows HESA to exclude graduates from the surveyable population, for example if they have become seriously ill, or have died, since graduating. During the first year of the survey,

⁵⁴ E.g. Properly-formed contact details could theoretically pass our checks, without necessarily belonging to the respondent we hope to reach.

⁵⁵ See <https://www.hesa.ac.uk/innovation/data-landscape/Codes-of-practice>

⁵⁶ See <https://www.hesa.ac.uk/innovation/outcomes/about/progress>

⁵⁷ See <https://www.hesa.ac.uk/blog/05-05-2021/improving-graduate-outcomes-response-rates-why-quality-contact-details-matter>

⁵⁸ See https://www.hesa.ac.uk/collection/c18071/quality_rules

we had excluded graduates whose providers had told us they were dead or seriously ill from the sample entirely. However, following reflection on the appropriateness of this analytical choice we determined that we should adopt a different approach from the second year. These graduates are in the population of interest and in the sampling frame so we do not wish to ignore them, however we must respect the ethical choice of providers in their decision not to pass on contact details in such circumstances. Nevertheless, providers cannot possess perfect knowledge of the health outcomes of graduates, and we found that we discovered cases where the graduate had died or become seriously ill through surveying. In some cases, we even elicited a response from seriously ill graduates. Given that the rates of serious illness and death among recent graduates appears to be very low, our approach here would be unlikely to have material impacts on our outputs, or on end users. The total number of graduates excluded in this way from the surveyable population for the first year was 150.⁵⁹ We note that a further 270 graduates were discovered to have died, or become seriously ill, during the collection of survey responses (this information was not independently verified). Subsequent investigation revealed a further 3 cases that had been excluded from the college HE data in England (one in Cohort C, two in Cohort D) and it was confirmed that there were no cases in Northern Ireland. The main impacts would be on the response rates of very small providers, but this is an insufficient argument, and since we anticipate that the distribution of these cases will be random, there is no reason to expect smaller providers to be affected disproportionately. We therefore determined that the appropriate approach would be to simply treat these graduates as a part of the sample, and where no contact details are provided, they are therefore treated as a non-respondent. We are still able to gather information from providers about their reasons for not including contact details in such cases, but the sample has now been aligned with the sampling frame, with the result that the survey is more inclusive and analysis is more straightforward.

Timeliness of the data in the sampling frame is a central consideration. The collection of contact details follows four phases, each aligned to one of the four cohorts (A, B, C, and D). Comprehensive information aimed at HE providers is published about timescales for collection activities.⁶⁰ Because the survey takes place approximately 15 months following course completion, allowance has to be made for changes of circumstance following this. Contact details are therefore collected during a period when the provider has had maximum opportunity to ensure they are as up-to-date as possible.

3.2.1.2. Sampling frame data based on other ingested data

A minority of HE study takes place in further education (FE) settings.⁶¹ We use the term ‘college HE’ to refer to this provision. HESA collects data about college HE students in Wales as part of its Student record (the process for this is the same as for the other data described in the paragraphs following this one). In England, Northern Ireland, and Scotland, college HE data is collected by other bodies.⁶² Given the prevalence and success of articulation agreements, graduates from

⁵⁹ The prevailing HESA approach to rounding and anonymisation has been applied to these and all other specific figures about people included in this report; full details can be found at

<https://www.hesa.ac.uk/about/regulation/data-protection/rounding-and-suppression-anonymise-statistics>

⁶⁰ See https://www.hesa.ac.uk/collection/c18071/data_collection_schedule

⁶¹ To summarise, in 2017/18, FE providers accounted for 0.5% of the UK’s total postgraduate enrolments, 1.4% of the UK’s total first degree enrolments, and 47.8% of the UK’s “other undergraduate” enrolments. For detailed figures and explanatory notes, see <https://www.hesa.ac.uk/data-and-analysis/sb255/figure-3b>.

⁶² In England, the Individualised Learner Record (ILR) is collected by the Education and Skills Funding Agency (ESFA). In Northern Ireland, the Assembly mandates the collection of the Consolidated Data Return (CDR) of which an extract is supplied to HESA by the Department for the Economy (Northern Ireland). In

college HE in Scotland are excluded from the survey coverage.⁶³ HESA ingests data about college HE students from the administrative records collected in England and Northern Ireland. This data, along with, in England, contact details found within these administrative records, is provided to HESA in a timely manner by the relevant bodies, in order to permit these college HE graduates to be contacted during the normal operation of the survey. Where contact details are not provided, or where the FE provider is able to source improved contact details, a Portal-based collection process identical to the one described in the previous section is employed to permit this. We do not describe the quality processes followed in the construction of these administrative records here, but we do provide supporting information for Further Education Colleges (FECs) in England and Northern Ireland.⁶⁴ College HE data collectors tend to see a record for each qualification aim separately, and hence they have to exercise judgement about when a qualification aim is 'nested' within a larger aim, and when it is suitable for driving survey coverage. Such matters are handled by skilled professionals, but they prudently acknowledge that there is a small risk of undercoverage or overcoverage occurring in situations such as unusual personal circumstances of a student, or where a qualification is unfamiliar. Further details should be sought from the data collectors (see footnote 62).

3.2.2. HOW DOES THE SAMPLING FRAME RELATE TO THE POPULATION?

This section deals with what we know about coverage error. The population of interest is graduates from HE-level courses. The exclusions from this are explicit and intentional (see footnote 43). The survey does not attempt to contact students who did not graduate – these individuals are counted elsewhere in HESA's Student data. Where students graduate with a different award than that they originally intended at the beginning of studies, they will be included in the sampling frame (except where they fall into the exclusions we list).

The administrative data described in the previous section comprises all publicly-funded and/or regulated HE providers in the UK. There are known instances of duplication of student identifiers between providers within the Individualised Learner Record (ILR)⁶⁵ (which does not have a globally unique identifier akin to the HESA unique student identifier, or HUSID) and between the ILR and HESA data (where 'franchise' arrangements exist). The Office for Students is expert in handling both types of duplication, and has isolated and removed these within their dataset prior to sharing data with HESA. Where other administrative data sources are concerned the separation of reporting environments militates against duplications occurring.

One legitimate question is how complete the administrative data is: could there be any undercoverage of HE graduates, because the provider they studied at is not included in the administrative data? In short, our sampling frame represents the overwhelming majority (probably in excess of 99% based on Hunt and Bolliver's figures⁶⁶), but not absolutely all, UK HE students.

Scotland, the government mandates the collection of the Further Education Statistics record (FES). However, the college HE activity in Scotland, collected in the FES, is not within coverage for the Graduate Outcomes survey.

⁶³ See the section on college HE: <https://www.hesa.ac.uk/collection/c18072/coverage#contents4>

⁶⁴ For FECs in England, see: <https://www.hesa.ac.uk/innovation/outcomes/providers/information-english-further-education-colleges>

For FECs in Northern Ireland, see:

<https://www.hesa.ac.uk/innovation/outcomes/providers/informationnorthern-irish-further-education-colleges>

FECs in Wales are longer-standing HESA subscribers, and information for them is consistent with the general information sources, here: <https://www.hesa.ac.uk/innovation/outcomes/providers> and elsewhere.

⁶⁵ See note 62, above.

⁶⁶ (Hunt & Boliver, 2019, p. 22)

While there is no definitive answer to how many are missing, it is known that a small amount of HE-level provision remains outside the formally-regulated sector. Research commissioned over eight years ago by the former Department of Business, Innovation and Skills identified a minimum estimate 'of 674 named privately funded HE providers operating in the UK. [...] Most providers identified [were] relatively small in scale; 217 of the 674 had fewer than 100 students. Only 35 providers had over 1000 students, with five of these having over 5000 students.'⁶⁷ Subsequently, the Higher Education and Research Act 2017 has had the effect of expanding the sphere of HE regulation in England to include a group of organisations referred to as 'Alternative Providers'.⁶⁸ While this terminology is no longer used officially, the providers brought into the regulated sphere under this designation are now included in administrative data returns used to create the sampling frame, and include the majority of larger organisations identified by the literature.⁶⁹ In the Graduate Outcomes open data, we provide some information at provider-level, and users can therefore see the list of providers, where data on their graduates is included in our outputs.

Volatility in the segment of the HE marketplace comprising the very smallest providers means that some will not have provided full data for inclusion in the sampling frame, nor would they have shouldered their share of the costs of surveying, having undergone market exit. Further research currently underway indicates that there are 'some 813 private providers in operation in the UK – a significant increase on the 732 and 674 recorded in 2014 and 2011 respectively.' Many of these 'are small scale, concentrating on sub-degree or postgraduate qualification across a narrow band of subjects – often characterised as being popular but with low overheads.'⁷⁰ For the most up-to-date documentation on what is known about the scale and scope of this part of the HE sector, readers are directed to the Hunt and Boliver paper listed in the references. In HESA's published data no attempt has yet been made to provide estimates that include this population, as we know too little about the characteristics of students and graduates from this part of the sector.

We therefore estimate that the list of graduates in the sampling frame comprises in excess of 99% of the population of interest, and that the impact of this slight undercoverage is therefore likely to be very slight in England, and negligible in Wales, Scotland, and Northern Ireland.⁷¹ However, we remind users of the discussion about the provenance of contact details collected against the sampling frame. The practical effect of missing contact details, and those found to be unusable or ineffective during fieldwork, reduces the effective size of the sample, and limits the achievable number of responses.

3.2.3. THE SAMPLE

Graduate Outcomes is a population-scale survey (or colloquially, a census).⁷² Our goal is to contact the entire sampling frame. The sampling frame and the sample are therefore largely synonymous.

⁶⁷ (Department for Business, Innovation and Skills, 2013, pp. 7–8)

⁶⁸ HERA 2017. <http://www.legislation.gov.uk/ukpga/2017/29/contents/enacted>

⁶⁹ Current public laws delineate the regulatory regimes in place, but do not compel all HE providers to register with a funder or regulator.

⁷⁰ (Hunt & Boliver, 2019, pp. 1–3)

⁷¹ Hunt and Boliver estimate 88% of private HE providers operate only in England.

⁷² Sometimes Graduate Outcomes is referred to as a "census". Strictly, a census enumerates a population, which is the central function of the HESA Student record. We use our pre-existing census data from the Student record(s) to construct a sampling frame for the Graduate Outcomes survey. We make no attempt to gather survey responses from graduates outside the sampling frame. However, there is no standard

A marker was developed to identify the sampling frame from within the HESA Student record(s), and appropriate file(s) were extracted. Similar logic was applied by the suppliers of the college HE data not collected by HESA. The datasets were then combined – no matching or linking was required.

Our ‘base population’ is the term used to refer to the dataset that comprises the entire sampling frame. This includes all graduates who fall within our coverage statement, but for whom we have inadequate, ineffective, or missing contact details, for whatever reason.⁷³ Hence, the survey sample is identical to the sampling frame. Graduates who exercise their right to opt out of the survey are also included in the denominator for response rates.

Response rate targets form part of the survey design. These rates are high, to reflect the desire among many users to evaluate smaller sub-samples as a part of their analysis, and thus to minimise the rate of unit non-response. Targets were set in October 2018, and further information on these is available in the Survey methodology.⁷⁴ HESA’s engagement strategy is the main tool for seeking high response rates.⁷⁵ Progress towards these targets (along with updates on the operational management of the survey) has been reported in a series of end of cohort reviews, published regularly on the HESA website up until the end of the second year of surveying.⁷⁶ Final response rates, by domicile and mode of study, are published in the Statistical Bulletin, with response rates by provider, domicile, level of qualification, and subject of study included in the subsequent Open Data.

We cover issues related to non-response in the next two sections.

3.2.4. SAMPLING ERROR AND NON-RESPONSE ERROR

Sampling error is the difference between a population value and an estimate based on a sample, and is one of the components of total survey error. It is normal for a quality report on a sample survey to offer a caveat explaining that, in principle, many random samples could be drawn and each would give different results, due to the fact that each sample would be made up of different people, who would give different answers to the questions asked. The spread of these results is the sampling variability. However, sampling error occurs because estimates are based on a sample rather than a census. As we have previously demonstrated, Graduate Outcomes is a population scale survey⁷⁷ where the sample is identical with the sampling frame, and the sampling frame resembles the population of interest very closely. While we know that the quality and

statistical term to describe a survey of (effectively) a whole population. It is fine to call Graduate Outcomes a census in everyday usage, but the term “population-scale survey” hopefully gets the same point across without falling into error.

⁷³ Our approach to collecting contact details means we may still manage to contact these graduates, if adequate contact details are supplied during the period of fieldwork.

⁷⁴ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/survey-targets>

⁷⁵ We do not publish the full engagement strategy. Instead, we provide an outline plan for each cohort, updated quarterly here: <https://www.hesa.ac.uk/definitions/operational-survey-information#engagement-plan> For an example of a more discursive account of the kinds of activities involved, see this blog post:

<https://www.hesa.ac.uk/innovation/outcomes/providers/engagement-plan/partial-complete>

⁷⁶ For a full list of mid-point and end of cohort reviews from the 2018/19 cycle, with infographics, see:

<https://www.hesa.ac.uk/innovation/outcomes/about/progress>

Reviews for the 2017/18 cycle can be found at:

<https://www.hesa.ac.uk/innovation/outcomes/about/progress/progress-updates-archive>

⁷⁷ See footnote 72 on p.27.

availability of contact details must affect the response rate we can achieve from the sample, to develop a comprehensive measure of quality is a complex exercise in the absence of a perfect and accessible descriptor of quality. We are however making significant improvements in our understanding of the various facets of quality, as described in section 3.2.1.1. We aspire to provide response rates not just as a proportion of the target population but also as a proportion of the contactable population. Therefore, the response rate achieved is itself our present best indicator of the quality of contact details. Hence, our analytical focus in this section is on the extent to which the achieved sample is representative of the population. We therefore focus on non-response error.

This section comprises two subsections, which cover the strategies HESA has followed to limit the practical effects of missing responses. In conducting a survey, one of the main types of non-sampling error that can arise is that resulting from non-response. Whilst a lower level of response causes a reduction in the precision of obtained estimates, the impact of response rates on bias is ambiguous.⁷⁸ The two types of error in this category are unit non-response⁷⁹ and item non-response.⁸⁰ We cover issues related to these in the next two sections.

3.2.4.1. Unit non-response error

Unit non-response occurs where a graduate does not respond to the survey. A poor response rate will result in less precision in any estimates we generate. Its effect on bias is less certain. Bias is determined by two components.⁸¹ These are the response rate, as well as the variation between respondent and non-respondent values. Hence, a better response rate can be associated with increased bias, if the discrepancy between those who respond to the survey and those who do not grows larger. Consequently, attempting to maximise response rates will not necessarily minimise non-response bias.⁸²

A number of elements of the survey design are intended to maximise response rates, and an overview is offered in the operational survey information on the HESA website⁸³. These include:

- A website aimed at respondents to reinforce the legitimacy and credentials of the survey⁸⁴
- A smartphone-optimised survey
- Allowing the survey to be completed in more than one stage, whether online, at the telephone, or using a mixture of both modes
- Bespoke email invitations and reminders that include the name of the graduate and their provider
- A dynamic engagement strategy informed by best practice and survey paradata
- Using a data collection platform that seamlessly integrates all modes together
- The adoption of a concurrent mixed-mode design (computer-assisted telephone interviewing (CATI) starts a week after the online system opens, and those who start online are not followed up until much later in the field period)

⁷⁸ As Koch and Blohm (2016) note.

⁷⁹ This is where we are missing all observations for a case – this would mainly happen in situations where we are unable to elicit any response from a graduate.

⁸⁰ This is where we are missing some observations for a case – a common situation might be a graduate who answers the survey, but does not wish to answer some questions in the survey. We explain more about how we handle this sort of issue, in the following section.

⁸¹ As Groves (2004) illustrates.

⁸² Keeter et al (2000) and Curtin et al (2000) are examples of previous studies that have demonstrated the phenomenon of achieving both higher response rates and bias.

⁸³ See <https://www.hesa.ac.uk/definitions/operational-survey-information#contact-centre-methodology>

⁸⁴ See <https://www.graduateoutcomes.ac.uk/>

- Increasing the convenience of responding for graduates, by making appointments for telephone interviews at times that suit them
- Collecting proxy responses from half-way through the fieldwork period.

For the rest of this section we cover the specifics of our approach where non-response bias is concerned. Root cause remediation is one of the practices HESA adopts to proactively manage data quality.⁸⁵ In this case, our goal was to reduce data quality issues arising during collection. Historically, organisations that have administered surveys have relied upon methods executed after collection (i.e. weighting) to deal with the challenge of non-response. Yet, over the last decade, those working in this area have increasingly looked at whether anything can also be done during the data gathering phase. Work by the Netherlands' official statistics agency⁸⁶ points to the advantages in attempting to do this, such as improved precision due to less variable weights. In trying to reduce non-response bias, other authors highlight the potential benefit of developing propensity models and subsequently diverting more attention to those individuals with a lower likelihood of responding in the latter stages of the collection process.⁸⁷ An adaptive survey design methodology was therefore designed and implemented from cohort C of the first year of the survey, onwards. This is subject to a quarterly refinement process where opportunities for improvements to our response propensity model are identified and where possible implemented by analysts. Details of the practical approach to case prioritisation we take (based on our response propensity model) are covered in detail in the section of the Survey methodology covering data collection.⁸⁸ In summary, approximately halfway through a collection cycle, a logit model (consisting of student and course characteristics as independent variables) is created to generate individual response propensities. Additional resource and effort is then allocated to obtaining responses from those graduates identified as being least likely to partake in the survey. The objective of this exercise is to ensure not only higher response rates, but also to reduce possible non-response bias by aspiring to achieve a more representative sample.

We cannot, however, simply assume that the adaptive survey design will achieve its objective. The resulting data must be assessed and if necessary, action taken to address bias. This is referred to as "weighting" the survey. The overarching objective of weighting is to enable the sample to be adjusted such that it is more representative of the population.⁸⁹ Most surveys are weighted following collection. However, the Graduate Outcomes survey has some unusual features, such as a large sample size, an adaptive survey design, and a concurrent mixed-mode data collection approach. We therefore undertook a study to determine whether year one of the Graduate Outcomes survey should be weighted. The recommendation of this study was that weighting will not be applied to all statistics published by HESA for this first year (17/18) of survey data. Our analysis of the survey data did not identify any evidence of bias relating to mis-match between the

⁸⁵ Addressing quality issues closest to their source is generally the most efficient approach, and follows established data quality management principles (Data Management Association, 2017, p. 453).

⁸⁶ (Schouten & Shlomo, 2017)

⁸⁷ See Rosen et al. (2014) for details. The use of this approach has also been applied in a similar fashion by Peytchev et al (2010) and Wagner (2013).

⁸⁸ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/data-collection> (particularly the section on case prioritisation).

⁸⁹ The creation of weights can comprise of several components. First, the base weight refers to the probability that an individual is selected into the sample given the design of the survey. In Graduate Outcomes, we aim to send the survey to everyone in the sampling frame. We have not quantified how many people actually receive the survey. Second, a (unit) non-response weight may be generated, which seeks to account for the fact that participation may vary among different groups. In instances where information is available on the entire population, a final step would be to ensure that the weights can allow the sample data to match known population totals for a chosen set of categories.

achieved sample and graduate population characteristics in any direction at sector level. Indeed, when analysing across a range of demographic and course variables, we found a high level of similarity between the sample and population distributions. We trialled various weighting methods, and these did not improve the quality of our estimates. Unweighted and weighted estimates were generated at the overall level, as well as by key subgroups for each of three different weighting methods.⁹⁰ Overall, across the breadth of HESA variables analysed, we generally observe close resemblance between the sample and the population, reducing concerns over potential bias. For a summary of our research and the findings, see the Survey methodology section on data analysis.⁹¹ Technical details of the study we undertook are also available in our research paper titled '*Should we weight?*'.⁹² This paper offers a detailed account of how we reached the decision not to apply weighting for year one of the survey. It describes the research methodology and illustrates the results that were found from the analysis. The paper is mainly aimed at academics, statisticians, and other interested parties wishing to understand the weighting research and its conclusions. Included in appendices A and B of the research paper, are a series of tables and graphs that illustrate our findings in detail.

For the second year of the survey, HESA commissioned an external report from the Institute for Social and Economic Research (ISER) at the University of Essex. The research objective was to understand whether the application of statistical weighting to the Graduate Outcomes survey would effectively mitigate the consequences of non-response by Graduates. The researchers were further asked to assess what (if any) estimation method should be used, and why, along with details of the variables that should be used in any weighting approach, and the rationale for this. To facilitate this the researchers were given appropriately-controlled access to microdata, and asked to compare weighted and unweighted estimates for the whole sample, but also for subsamples by provider, by subject, by subject within provider, and by protected characteristics (including measures of disadvantage). Since Graduate Outcomes is a population-scale survey, any design weight assigned to individuals would be the same. However, we wanted to determine what the best approach (if any) would be for ensuring the sample matches to known population totals. We also required an investigation into whether a non-response adjustment is necessary. The brief for the investigation was not a replication of our previous work. Instead we wanted to explore the impact of weighting on estimates for the proportion in highly skilled employment and/or further study using the year one survey data and to take the opportunity to extend the work HESA have done using the proportion in employment and/or further study outcome. We also asked the researchers to test weighting approaches not previously examined by HESA researchers. In summary, the research found that weighting reduced the measurable error for only a minority of estimates, and where this was the case, the magnitude of the reduction was very small. Alternative models did not reveal substantially different results. There is therefore no advantage to be gained by using weighted estimation. This is a rather unusual finding for a survey (where the starting

⁹⁰ This included subject area, provider and subject area within providers, which tend to be groups of interest for different stakeholders across the sector (e.g. to help providers evaluate their performance and for prospective students considering what course to study). As policy matters in this area are devolved across the four nations, estimates were also produced by country of provider. Additionally, the Equality Act of 2010 requires public sector bodies to promote equal opportunity among individuals from all types of backgrounds. Consequently, we have also produced estimates by some of the key protected characteristics, such as age, ethnicity, disability and gender. Others such as marital status and gender reassignment were not covered, due to insufficient coverage in the data.

⁹¹ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/data-analysis>

⁹² See <https://www.hesa.ac.uk/files/Graduate-Outcomes-Should-we-weight-20200521.pdf>

assumption is always that weighting will be required) which corroborates the similar finding we made based on the year one data. The full report from ISER is available on HESA's website.⁹³

Some statistics published from the Graduate Outcomes survey are at a very granular level, e.g. activity by provider, domicile, level of qualification and mode of qualification. In some cases, the sample size for such statistics may be small. In these cases, the statistics may be subject to high levels of variability and a lack of statistical precision. Confidence intervals on these statistics (ranges within which we have a high level of confidence that the equivalent whole-population parameter would fall, where a narrow range indicates greater precision and a wide range indicates less precision) are, for key tables, published alongside the data.

In addition, for some statistics, it may be necessary to introduce publication thresholds whereby statistics based on very small sample sizes and/or lower response rates are suppressed – this will be explained in any statistical releases where this decision is taken.⁹⁴

Research to date therefore indicates there is no evidence of measurable non-response bias in the data. We are fortunate to be able to link to good data on population characteristics to support these assessments. The risk of non-response bias appears to have been minimised by the combination of relatively high response rates, and the adaptive survey design. Despite this, it is not easy to quantify the extent to which non-response bias remains a problem. There may be variables that we are not currently measuring that are more strongly correlated with unit nonresponse. As noted in '*Should we weight?*' the Longitudinal Educational Outcomes data offers a suitable external source for analysis of bias, and undertaking this work forms part of our future plans. Survey paradata may also prove useful in this respect in future. Users of Graduate Outcomes microdata may wish to conduct their own analyses to ensure the Graduate Outcomes data supports their analytical objectives. However, users should be reassured that there is no evidence to suggest that measurable non-response bias is present in the Graduate Outcomes survey data.

3.2.4.2. Item non-response error

Item non-response occurs where a value for a particular variable is missing for a graduate, in a case where this observation was expected. In our survey, this typically occurs when respondents decline to answer particular questions. No single graduate is expected to answer all available survey questions. A routing structure directs respondents to particular sets of questions that are most relevant to their circumstances.⁹⁵ Furthermore, optional questions will not be presented to all respondents. So, some data will not be present, but this does not mean it is missing – it may never have been sought, as it was not relevant to be asked in that case. In HESA's publications, these issues will be made clear in the data and the notes, for example by indicating the sample used to produce a table or chart in its title, and by enumerating the unknown values. Researchers and other microdata users in particular will need to note this feature of the survey.

⁹³ See <https://www.hesa.ac.uk/files/ISER-Graduate-Outcomes-weighting-report-20210720.pdf>

⁹⁴ Where suppression is applied, this will be done in line with the prevailing HESA statistical confidentiality policy (see <https://www.hesa.ac.uk/about/regulation/official-statistics/confidentiality>) and the associated rounding and suppression approach: <https://www.hesa.ac.uk/about/regulation/data-protection/rounding-and-suppression-anonymise-statistics> (summarised in section 3.4.1 of this report).

⁹⁵ A flow diagram showing the survey response record fields produced given each survey routing, is available in the coding manual:

https://www.hesa.ac.uk/collection/c18072/download/Overall_Survey_Routing_Structure.pdf

A derived field (ZRESPSTATUS⁹⁶) describes the status of response to the Graduate Outcomes survey for each graduate for whom some (however minimal) results data has been received. A core set of mandatory questions⁹⁷ are required to be completed for a response to be marked as completed. This field classifies responses into categories denoting various states of completeness. The terms 'complete' and 'full response'⁹⁸ are used interchangeably to refer to those cases where all the questions requiring a response have been completed and are populated with an answer. In addition to responses classified as 'survey completed',⁹⁹ a status of 'partially completed'¹⁰⁰ has been assigned where some of the core questions are missing but the first two questions have been answered.¹⁰¹ Although partially completed responses do not contribute to the survey's response rate targets, partially complete responses are used alongside 'survey completed' responses in statistical outputs. Again, data from such responses will appear in published statistics in the following ways: in tables with numbers, unknown values are shown for questions that were not answered. Wherever we display % values, we exclude unknowns from the calculations. The sample used will be clear in the title or accompanying text.

Just as unit non-response has the potential to introduce bias into overall survey results, item non-response can also introduce bias into estimates based on responses to specific questions which experience a relatively high proportion of survey drop-out. Where this non-response is non-randomly distributed for reasons such as question sensitivity and social desirability bias, it is important that patterns of non-response are well understood¹⁰². This would enable us to implement treatment plans to reduce non-response and therefore the risk of bias.

So far, we have observed a high completion and a very low drop out rate in Graduate Outcomes. Most people (more than 90%) who start responding to the Graduate Outcomes survey tend to complete it. This not only reduces the risk of item non-response, but it also reduces the requirement for interventions. HESA has started a program of work which is aimed at getting a better understanding of the characteristics of and reasons behind unit and item non-response, leading to the development and implementation of treatment plans where necessary and possible. With regards to item non-response, we are currently prioritising the most sensitive questions in the survey which are prone to higher drop-out rates compared with other questions. Questions relating to the following topics have been shortlisted in the first instance: Job title, Salary, Employer's name, Subjective well-being. The following table contains response rates for each of these questions in the 2018/19 survey.

⁹⁶ See the derived field specification at: <https://www.hesa.ac.uk/collection/c18072/derived/zrespstatus>

⁹⁷ Details of mandatory questions can be found as a PDF download from:

<https://www.hesa.ac.uk/innovation/outcomes/survey>

⁹⁸ See <https://www.hesa.ac.uk/definitions/glossary#F>

⁹⁹ ZRESPSTATUS=04

¹⁰⁰ ZRESPSTATUS=03

¹⁰¹ The observations gathered from the first two survey questions permit the derived field XACTIVITY to be produced – see <https://www.hesa.ac.uk/collection/c18072/derived/xactivity>. Since 'activity' is the Graduate Outcomes survey's central concept, these responses are often partly usable.

¹⁰² (De Leeuw, Hox and Huisman, 2003)

Table 5 Response rates for sensitive questions, year two

Question/topic	Response rate	Base description
Job title (employment)	96.1%	Graduates in or due to start employment
Job title (self-employment, business, portfolio)	93.4%	Graduates in self-employment, running a business or developing a portfolio
Employer's name (employment)	92.7%	Graduates in or due to start employment
Employer's name (self-employment, business)	91.5%	Graduates in self-employment or running a business
Salary	93.0%	Graduates in employment or self-employment
Subjective well-being	88.6%	Graduates who have answered at least the first question

It is evident from the above table that most sensitive questions in the survey perform extremely well and are not likely to pose a threat to the robustness of data. Even though item non-response rates are low, in year three we are preparing to introduce a new functionality to the survey that would provide additional guidance to graduates who are unsure about responding to these sensitive questions. It will be in the form of information buttons that explain the reason behind collecting this information, with the aim of addressing respondents' concerns. This information will be available on the self-completion as well as the CATI mode to ensure consistency across the two data collection systems. This is expected to reassure concerned respondents and hopefully reduce non-response rates even further.

The only survey question in the above table with a slightly lower response rate is subjective well-being. This question appears right at the end of the survey and as mentioned above the base population used to calculate the response rate comprises all individuals who answered at least the first question. There were plenty of 'opportunities' for respondents to discontinue the survey before they even reached the subjective well-being questions. The questions themselves are therefore not expected to have a detrimental impact on data quality if respondents did not even have a chance to see them. This is evident from the fact that of those who answer the minimum set of questions required for a complete response, 95.5% go on to answer at least one of the well-being questions (which appear after the minimum set in the survey).

This in turn raises the question around the method of calculating item non-response. So far, we have used a cautious method involving an assessment of the eligibility of a graduate to respond to a question based on their activities (i.e., response to the first question). This tends to be useful to analysts, as the activity groupings are most often used as the basis for various analyses of sub-groups. However, it is arguable that a more accurate method of calculation would incorporate response to the previous question and using that as the base. This poses some challenges given the complex routing structure within the survey. We continue to review our methodology and hope to publish more refined set of statistics in future. These would include non-sensitive questions which were excluded from the analysis so far.

3.2.5. PROXY RESPONSES

A proxy response is a response made on behalf of the sampled graduate by someone other than the graduate. It is an indicator of accuracy as information given by a proxy may be less accurate

than information given by the desired respondent. However, if the respondent is unavailable, someone in their household or family (who is therefore likely to know them well) may be able to offer some useful information about their activity. Since our users value high levels of completeness, we viewed the risks to accuracy and reliability as acceptable, if we could seek to minimise them.

Our survey therefore uses the following strategy to minimise proxy responses. During the first half of the field period for each cohort (approximately six or seven weeks) proxy responses are not sought by telephone interviewers. During the second half of the field period, interviewers are advised to collect responses from third parties, where possible, and where a suitable proxy respondent (defined as a partner, relative, carer or close friend) is available. Only the mandatory questions are asked of proxies, and subjective questions are excluded. We do not collect proxy responses from the graduates of English Further Education Colleges as a matter of policy.¹⁰³ We also make sure that responses collected from third parties do not exceed 10% of a provider's target population, limiting the impact on data quality.

In the first year of surveying, we introduced proxy surveying for the first time at the halfway point of cohort B, but no proxy responses were collected. We activated proxy surveying functionality again halfway through surveying cohort C, and we received 10 proxy responses between this point and the end of cohort C. We took the same approach by introducing proxy surveying as an option at the mid-way point during cohort D. Between that point and the close of cohort D, we surveyed 1,755 proxy respondents. This equates to 0.5% of the total number of responses.

In the second year of surveying, utilising the method of introduction of proxy responses at the half-way point as established in year one, but applying it to all cohorts, the total numbers of proxy responses received dropped to a total of 1,190, as follows:

Table 6 Numbers of proxy responses gathered during year two of survey fieldwork

Cohort	Number of proxy responses
A	285
B	30
C	25
D	850

Given how few proxy responses we have obtained, and the controls in place to manage these, as well as a lack of feedback from users, we have not provided information on proxy responses in the published outputs. To further support users' understanding of the likely accuracy or reliability of this data, we would ideally like to provide this information to all users in the microdata. Since we possess the survey paradata required, adding this variable to the derived fields remains a potential target for future improvement. However, feedback from users has not indicated this to be a high priority.

3.2.6. MEASUREMENT ERROR

Measurement error occurs from failing to collect the true data values from respondents. Potential sources of measurement error in Graduate Outcomes are: the survey instrument(s); the telephone interviewers, and the respondents themselves. This section of the report covers these aspects, in

¹⁰³ Information on who can answer the survey is available under the privacy notice <https://www.graduateoutcomes.ac.uk/privacy-info>

turn. The mode of data collection is also a source of measurement error, and we cover this in more detail in the next section.

3.2.6.1. Respondent error

The survey takes the following measures to minimise respondent error. We cognitively tested the survey questions prior to launch, and adapted our questionnaire design in the light of the research findings. Information on cognitive testing is available in a technical report¹⁰⁴ and an outcomes report.¹⁰⁵ The implementation of the survey questions in the survey instrument was undertaken with expert input and testing from HESA and our suppliers, in order to pro-actively identify and overcome potential respondent error issues.

The survey instrument is available in both English and Welsh languages. This allows respondents graduating from providers in Wales to use whichever language they prefer. This should reduce respondent error due to language issues.

The instrument is deployed online, and over the telephone, which offers respondents some choice over how to engage. Details about the implementation of the instrument can be found in the Survey methodology sections dealing with the online¹⁰⁶ and telephone¹⁰⁷ based aspects of our approach, and these materials also contain further information about how we seek to minimise respondent error. Online, we use a series of prompts to encourage the respondent to check the accuracy of their responses. Over the telephone, our interviewers' script similarly prompts operatives to elicit accurate responses through checking understanding back with the respondent. (We will from now on refer to the computer-assisted telephone interviewing by its widely-accepted acronym – CATI.)

Some examples of respondent error we believe may occur are:

- Information retrieval may be difficult for those respondents reporting several jobs. They may not remember precisely, or may not have access to, information about, for example, their previous earnings for a job they left months beforehand.
- Brevity or lack of response to free text questions could lead to differences in SOC codes for graduates in similar jobs. This equally applies to other coded free-text data. However, the SOC coding process would be more sensitive to this sort of issue, than, for example, free text country data, as the input data is more extensive, and there is some degree of semantic overlap between the output codes.
- Cases where respondents select unemployed and paid work simultaneously. (During the first year of the survey of the respondents in paid work for an employer, 950 had also indicated they are unemployed. Of these, 270 had said that being unemployed was their most important activity). In the second year of the survey, of the respondents in paid work for an employer, 1,085 had also indicated that they are unemployed. Of these, 330 had said that being employed was their most important activity.¹⁰⁸
- Acquiescence bias (sometimes called agreement bias, 'straight-lining', or alternatively referred to as 'yea-saying/nay-saying') is where there is a tendency on the part of respondents to indicate positive (or negative) responses in a routine fashion, perhaps not

¹⁰⁴ See <https://www.hesa.ac.uk/files/Cognitive%20Testing%20Technical%20report.pdf>

¹⁰⁵ See <https://www.hesa.ac.uk/files/Cognitive%20Testing%20Outcomes%20report.pdf>

¹⁰⁶ For online aspects, see: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/online-survey-design>

¹⁰⁷ For telephone and contact centre aspects of the instrument, see <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/telephone-survey-design>

¹⁰⁸ For details of how HESA reflects this contradictory information in published outputs, see the XACTIVITY specification at: <https://www.hesa.ac.uk/collection/c18072/derived/xactivity>

reflecting their 'true' feelings. The design of the survey mitigates this by avoiding questions where this kind of response is easy to offer and HESA is continuously reviewing the impact of survey design on response distribution.

- Social desirability bias occurs where respondents tend to give socially desirable responses instead of choosing responses that are reflective of their 'true' situation. Examples where this could occur might include reporting a higher salary, or a greater sense of subjective wellbeing (SWB). Other studies have indicated that this kind of bias may vary by mode of response.

For details of our investigations into these forms of respondent error, readers are directed to the section 3.2.8. Reliability of sensitive data, where we discuss our analysis of the data. While further work is required to investigate the extent of these forms of bias on the survey, we are able to show the current extent of our understanding of their effect.

In the dissemination section of the Graduate Outcomes Survey methodology, details are given about how HESA interprets and publishes responses.¹⁰⁹ In the section of the Survey methodology covering key data concepts and standards, explanations are given around the analysis that has been carried out on a number of key data items. In the section on salary, there is specific information about the approach HESA has taken to handling any potential respondent error. This includes an update to the approach we have taken in trimming the salaries to exclude outliers, and future corrective actions, including improvements to the instrument to reduce the risk of misunderstanding that leads to respondent error.

One limitation on the respondent's ability to correct their own errors is the unavailability of a 'back' button in the online survey. Respondents are therefore unable to go back and change their answers to previous questions. This is done largely for data protection reasons (this is covered at greater length in the section of the Survey methodology on the online survey design);¹¹⁰ it also reduces the risk of 'orphaned' data occurring, where a respondent enters data that is not required when they subsequently return to an earlier point in the survey to make an alternative choice, which consequently alters their survey routing.

During the first few cohorts of year one, we noticed that some respondents indicated they believed they should not be in the sample because they had not graduated. This sometimes occurred when they had gone on to further study or had only completed part of their qualification but were still eligible to take part based on that component. We amended the introduction to the survey to allow interviewers more time to explain the eligibility, if needed. We also made necessary amendments to our emails and other communication highlighting the eligibility criterion as having completed a sufficient component of an HE course. This amendment was implemented in cohort C of year one. Compared with the previous year, in year two 30% fewer respondents said they were not eligible to participate in the survey.

We are aware that more evidence needs to be gathered on whether respondent error represents a significant issue in the survey. For instance, for those who stated in the survey that they were undertaking further study in the UK HE sector, there is the potential to link their response to the HESA student record. This would offer the opportunity to evaluate the extent of measurement error in this part of the survey. Further investigations have been undertaken into this issue, and an interim digest of these is covered in section 3.5.2.1.

¹⁰⁹ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/dissemination>

¹¹⁰ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/online-survey-design>

3.2.6.2. Survey instrument error

Significant effort is invested in reducing opportunities for instrument error, and the first element of this is the choices of platforms, partners, and personnel involved. HESA manages the survey and appoints the suppliers.¹¹¹ HESA's procurement and supplier management approaches seek to ensure that suppliers deliver on process quality requirements imposed by HESA. Conformat remains HESA's feedback management solution supplier. Conformat's technology is widely used to conduct surveys by leading sector bodies, including the Office for National Statistics, and also in market research contexts. It includes a smartphone compatible online system. HESA's current contact centre provider is IFF research. IFF has worked with many individual providers, previously, in their delivery of Graduate Outcomes predecessor DLHE. IFF was also the survey contractor for all six iterations of the Longitudinal DLHE survey.

The survey instrument is ultimately HESA's responsibility, and HESA is an official statistics producer with a track record in delivering the DLHE and LDLHE (Longitudinal Destinations of Leavers from Higher Education) surveys for over twenty years as well as a successful launch of the Graduate Outcomes survey with 'a range of positive features that demonstrate the trustworthiness, quality and value of the statistics'.¹¹² HESA's staff are skilled across the range of statistical business processes, including developing the methodologies, procuring survey and coding services, developing and commissioning software systems, data processing and enrichment, quality assurance, conducting and commissioning research, analysis, dissemination, and undertaking reviews. Users can therefore trust that the survey is being delivered by an organisation with experience and skill in appropriate professional domains.

The instrument was tested thoroughly by staff from HESA, IFF, and Conformat prior to deployment. However, the complexity of the survey routing meant that some less likely routing combinations were only tested to a limited extent. All problems discovered during testing were fixed prior to launch. We also note that Conformat nominated HESA the judges' choice in their 'Achievement in Insight and Research' awards in September 2019 in recognition of the high standards, creativity and innovation with which their platform is being used.

HESA demonstrates an evidence-based approach to operational data quality management, backed up by a clear governance approach. A log is kept of all instances of potential instrument error and a process is operated to investigate and assess each issue for the level of its impact. This approach is substantiated by regular progress updates, which explain these same issues to stakeholders.¹¹³

The survey instrument is generally of high quality, and during the second year of operations, the platform remained stable throughout operations, and performance remained consistent with the levels established for Cohort D of the first year, throughout. A catalogue of issues discovered during the first year of operations, and their treatment, is available in the previous edition of this report.

We summarise the main sources of potential instrument error relating to year two of the survey in the following subsections.

¹¹¹ See our press release: <https://www.hesa.ac.uk/news/14-11-2018/complete-graduate-outcomes-line-up>

¹¹² See OSR's letter to HESA of 2021-03-18: <https://osr.statisticsauthority.gov.uk/correspondence/mark-pont-to-jonathan-waller-higher-education-graduate-outcomes-data/>

¹¹³ Readers wishing to understand these issues in detail, and in chronological order, are recommended to read the midpoint and end of cohort reviews, which are published at: <https://www.hesa.ac.uk/innovation/outcomes/about/progress>

3.2.6.2.1. Survey routing issues

As noted above, respondents are not able to return to previous answers to amend them. While this could potentially increase respondent error, it reduces survey instrument error. However, CATI operatives retain access to a 'back' button (to maintain a good interviewer-respondent relationship). This means that there is still a small risk of processing error arising; this risk, however, is ameliorated considerably through CATI operative awareness and training, and by increasing the validation checks undertaken either automatically, or through analysis.

An error in survey routing discovered in year 2 has meant that for a subset of graduates in further study, information on the country of their provider is not available if they selected 'other' in provider name (instead of a named UK provider from the drop-down list) and did not enter the name of the provider when prompted.¹¹⁴ This is likely to result in a higher number of records with missing country information, where the provider was 'other'. This routing error was fixed before the start of cohort C (18/19). All other similar instances in survey routing were checked to ensure this was not replicated elsewhere. Prior to Cohort C there were 6,070 respondents that selected 'Other' in their provider name. Of these, there were 1,415 where the country field was blank. No additional issues were found.

A further issue was discovered in the routing of the graduate voice questions, according to which some graduates who reported being in employment were routed to the ACTMEAN, ACTONTRACK, and ACTSKILLS variables, rather than WORKMEAN, WORKONTRACK, and WORKSKILLS.

Graduates are routed to WORKMEAN, WORKONTRACK, and WORKSKILLS only if their ALLACT response includes only one option, and that one option is one of the five possible 'work' options (ALLACT01, ALLACT02, ALLACT03, ALLACT04, or ALLACT05). Graduates who respond to ALLACT with ALLACT07, ALLACT08, ALLACT09, ALLACT10, or ALLACT11 or who provide multiple responses are routed into ACTMEAN, ACTONTRACK, and ACTSKILLS. Graduates engaged in multiple activities and routed to ACTMEAN, ACTONTRACK, and ACTSKILLS may be doing multiple types of activity (work and study, work and something else, study and something else), or they may be doing multiple types of work.¹¹⁵

This routing issue poses a problem for analysis, since, when graduates engaged in multiple activities and routed to ACTMEAN, ACTONTRACK, and ACTSKILLS are asked, for example, 'the extent to which their current activity is meaningful', it is not possible to determine with reference to which of their multiple activities they choose to answer. Thus if a graduate should be in paid employment and acting as a carer, or in paid employment and running their own business, we cannot determine whether that graduate's responses to ACTMEAN refer to the meaningfulness of their paid employment or the meaningfulness of their other activity.

In the Graduate Outcomes publications, responses to all three variations of the graduate voice questions (WORK-, ACT-, STUDY-) are combined and filtered by activity. As described above, the graduate voice data for graduates in employment may be based on responses to either the ACT- or the WORK- variables, and we cannot be certain that graduates in employment responding to the ACT- variables will have been thinking about their employment in their responses.

¹¹⁴ Users may wish to note that this problem was discovered in the fix we had applied to address a previous data quality issue that affecting 5,040 records. This was referred to in the previous iteration of this report.

¹¹⁵ Similarly, if graduates ticked ALLACT06 - Activity - Engaged in a course of study, training or research with any other combination. They were routed to the STUDYMEAN, STUDYONTRACK, STUDYSKILLS questions.

A review of the implementation of the questionnaire is currently being undertaken and will include consideration of the routing issues described above. The review will also include further testing of survey routing with a specific emphasis on the handling of unexpected or less expected responses. We will announce any further issues and corrective actions identified by this review in due course.

3.2.6.2.2. Survey alterations to increase retention

Relatively few alterations were required during the first year of the survey, and these are catalogued in the first edition of this report.¹¹⁶

During the second year, as the Coronavirus pandemic hit, we assessed the need for rapid changes to the survey. These are catalogued in detail in an online briefing within our Coronavirus update¹¹⁷, but in brief, we focussed on ensuring that graduates could self-administer the survey to reflect their personal situation. To ensure that respondents who are furloughed under the Government scheme (remaining technically employed) select the correct option at 'What activities were you doing in [CENSUS WEEK]', we added additional text to code 01 (Paid work) to clarify that this does include furloughed employees. Furthermore, with higher levels of unemployment / volunteering / care-giving / interruptions to further education, we believed a greater percentage of respondents would be likely to skip past the work / study sections and arrive at the wellbeing questions relatively early-on in the survey. We felt that under the circumstances, to some individuals, this might have felt insensitive. We therefore added supportive text to the survey (both on the online and CATI version) which signposts participants to mental health and wellbeing organisations across the world (the Samaritans, Befrienders Worldwide and Mind).

3.2.6.2.3. Email and SMS delivery

Where providers have supplied email addresses for graduates on their domain e.g. joe.bloggs@[provider].ac.uk, they are advised to be mindful of the expiry period for these addresses. Some providers allow graduates to keep these addresses for life, others expire them after a fixed period (e.g. six month post-course completion). These email addresses should only be returned as valid graduate contact details for Graduate Outcomes when they are still live accounts on providers' systems. Where providers are satisfied that the provider domain email address will be live at the point of HESA contact, we have suggested that providers allow-list the relevant email sender address which will be [providername]@graduateoutcomes.ac.uk. This will help ensure these emails are delivered successfully. It is important that provider domain email addresses are still live as this has an impact on HESA's IP address reputation. Should provider domain email addresses be shut down at the start of the survey period, this may lead to our emails bouncing and our IP address being deny-listed. This would put a halt to HESA's email capability thus restricting our surveying to phone or SMS only. Providers are therefore further incentivised to pay attention to this quality factor.

At the start of the year two (18/19) survey, we tested three different email subject lines for invitation emails to identify specific themes that are more likely to encourage graduates to open their emails. Starting with an initial sample of 163,070 three equally sized randomised groups were created, each one receiving a different subject line. The content of the email was the same in all three cases. In order to get a non-biased representation of the population in each subset, graduates were distributed equally across the three groups by the following characteristics: domicile, level of study, and type of provider.

¹¹⁶ See https://www.hesa.ac.uk/files/Graduate_Outcomes_Quality_Report_20200618.pdf

¹¹⁷ See: <https://www.hesa.ac.uk/news/coronavirus#acc1>

Following analysis of paradata collected alongside the survey, we found one subject line achieving a much higher open rate and click rate, compared with the other two. While there was one clear winner, a sizeable proportion did respond to the other two subject lines suggesting there is no perfect template for what works in this context. The use of multiple subject lines is likely to be the best course of action. This has been further confirmed throughout the rest of the cohort where we changed subject lines every so often which resulted in a sudden rise in open, click and completion rates. We have continued with this approach, subsequently.

Email delivery rates continue to be extremely high in every round of invitations, ranging from 97-99%. SMS delivery rates have also remained high at 89.6% for the first SMS invitation (utilising all available UK mobile numbers). Completion via SMS link was responsible for 40% of all the online survey responses received during cohort D.

Delivery rates are not directly correlated with response rates. Open rates are a more useful indicator of the likelihood of online survey participation. We do not have data for SMS open rates, but we have information on email open rates. It has been observed that open rates for emails reduced in cohort D, compared with previous year, resulting in an overall lowering of online response rates. The online response rate in cohort D this year was 19.5%, compared with 22.3% in the previous year. A similar difference was also observed in cohort C, but not in cohorts A and B. While it is not possible to categorically attribute this observation to the Covid-19 pandemic, it is possible that a significant increase in our online activity for most essential tasks has had a negative impact on an individual's motivation to participate in what might seem like a non-essential online activity. (We are, however, seeing positive signs in online uptake in the first cohort of year three, alleviating immediate concerns of a downward trend.)

A more tangible explanation for low open rates, and therefore low response rates, can be obtained if we consider the type and quality of email addresses in the sample. Of all the graduates in cohort D, 1.2% did not have an email address. Of all the UK domiciled graduates 7.4% were either missing an email address or a mobile number, therefore reducing their chances of being contacted to complete the survey online. Our research suggests that online response rate is much higher when both modes of contact are available (email and SMS). A review of contact details by providers was undertaken to explain why some providers might have a lower response rate compared with others. Actions were taken with specific providers where our analysis indicated this would be fruitful.

Some graduates do not respond to any of the reminder emails. Of all the graduates with an email address, at least 2% had only a ".ac.uk" address, which has so far proven to be least reliable in contacting graduates. For graduates with just one email address, it takes 3-4 emails on average to achieve a complete response, with a third of all online respondents doing so after the first invitation. There is a clear indication that UK domiciled graduates require fewer reminders to complete the survey than non-UK graduates.

3.2.6.2.4. Call handling

There are numerous indicators suggesting that the telephone interviewing component of Graduate Outcomes and call handling approach described in the previous edition of this report, is now firmly established and delivering successful outcomes for the project. Responses to the telephone survey increased by 9% in cohort D and 14% across the whole second year. This not only recovered the deficit in online response rates in the last two cohorts but also brought the overall rates closer to the target. More people tend to refuse to take part in the survey over the telephone than they do

online. While the percentage of refusals remained similar in the first three cohorts, across the two years, the rate halved in the final cohort. Although landline numbers tend to perform worse than mobile numbers generally, in cohort D this year the completion rate on landline numbers was higher than expected. More graduates being at home because of the Covid-19 pandemic lockdowns, has meant that landline calls have generally been more productive. For the first time in the survey, we adopted a more focused data collection strategy aimed at graduates with UK home addresses. During November, we stopped calling non-UK graduates (except those with scheduled appointments) to focus our efforts on the UK group, as this was deemed to be the priority. Similarly, for the purpose of case prioritisation (an exercise aimed at reducing non-response bias), we exclusively targeted graduates with UK home addresses.

Towards the end of a cohort, we start observing signs of the sample becoming tired with low call pick-up and response rates. However, cohort D was unusual with sufficient 'live' sample still available in the final few weeks of the field period. Unfortunately, to keep the survey costs within the subscription cost limits, we had to ask our contact centre to significantly reduce call volumes in the final few days. Online data collection continued right through to the end of the 3-month period.

3.2.6.3. Interviewer error

Interviewer error is the effect of a human interviewer on the data gathering process. Graduate Outcomes uses many interviewers concurrently. CATI interviewers undergo training developed especially for the Graduate Outcomes survey, and which focuses on the contextual knowledge interviewers need to perform their roles effectively. They are recruited and trained by IFF according to closely-monitored quality criteria. Quality assurance by monitoring calls is also a part of the standard practice. All interviews are recorded digitally to keep an accurate record of interviews. A minimum of 5% of each interviewers' calls are reviewed in full by a team leader. Quality control reviews are all documented using a series of scores. Should an interviewer have below acceptable scores, this will be discussed with them along with the issue raised, an action plan agreed and signed, and their work further quality controlled. Information about this is covered in the data collection section of the Survey methodology.¹¹⁸ Further details are given in the operational survey information section on the contact centre.¹¹⁹

CATI operatives utilise an adapted version of the same instrument as online respondents. This allows a further level of data quality checks to be performed, as CATI operatives get similar feedback from the online instrument to online respondents, in addition to having their own quality processes built into the script. This also prevents any 'clash' or data problems occurring due to respondent mode switches. One difference is that a 'back button' is available to CATI operatives, which allows adjustments to be made, if a respondent wishes to change an earlier answer in the light of a later question. This kind of anecdotal feedback could help identify potential sources of respondent error, and HESA and IFF evaluate feedback from CATI operatives regularly, to determine if instrument improvements could offer marginal enhancements to data collection. While human error is always a potential factor, this is likely to be a matter of random variance in keying errors. There is no evidence to suggest that interviewer error has had any significant impact on the conduct of the survey. Rather, CATI operatives are a useful source of quality improvement suggestions, and regular fortnightly meetings occur where performance and survey issues are discussed, and recommendations logged for further assessment and action.

¹¹⁸ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/data-collection>

¹¹⁹ See <https://www.hesa.ac.uk/definitions/operational-survey-information#contact-centre-methodology>

3.2.7. MODE EFFECTS

A mode effect is a systematic difference that is attributable to the mode of data collection. Analysing the effect of mode on item responses (and aspects of response propensity) is part of our current programme of work.

Mixed-mode surveys are increasingly common. A typical research survey operated in a mixed-mode fashion might survey a sample electronically, and then follow-up with a telephone survey later on, either to provide a more qualitative set of insights into a sub-sample, or to address non-response issues during the initial survey period. There are many possible such designs. The design of the Graduate Outcomes survey was a collaborative exercise that took into account knowledge developed by HESA and the HE sector during the operation of DLHE and LDLHE (Longitudinal Destinations of Leavers from Higher Education), its predecessor surveys. One important factor we took into account was the widely-held perception that telephone surveying from an early stage, combined with online surveying, was likely to be necessary in order to meet user needs for both high response rates and efficiencies generated through an online mode. We therefore sought to retain the best aspects of the previous practices, and these are reflected in making a concurrent mixed-mode design our adopted approach.¹²⁰

Our approach is described in detail in the section of the Survey methodology covering data collection,¹²¹ and in the associated operational survey information.¹²² It is underpinned by a single technology solution (Confirmit) that links online (mobile and desktop) and telephone-based modes together seamlessly. Survey responses can be saved and picked-up later, in either mode. In practice, this means that respondents may begin the survey in one mode, and end it in another, or even, potentially, change mode several times during the period of time within which they are engaging with the survey. The system logs all events, and these system logs form the basis of HESA's paradata, including modal information. The paradata, which also includes timing and duration information, is very rich, but also requires some complex scripting to access, and, as we learn more about the capabilities of this system, we are extending the catalogue of paradata we wish to extract from the system. This system-generated logging data is, in its own way, as rich as the collected survey data itself, and offers us insights into the behavioural characteristics of respondents. When combined with our data on the population characteristics, it also yields potential insights into non-respondents. Our initial task has therefore been to define more precisely the characteristics of the various survey engagement modes.

Our current paradata dictionary includes variables for the start mode, partial completion mode, completion mode, various status markers, last question viewed, number of calls made, and a range of variables relating to the sending of emails and SMS messages.¹²³ Throughout the second year of operations we have been using some of this paradata to inform our data collection processes such as identifying the most suitable time for sending emails and SMSs based on completion times, changing subject lines to encourage higher email open and click rates, monitoring interviewer performance using average number of calls, to name a few.

¹²⁰ For completeness, we must explain that a separate, paper-based approach is used in a minority of cases where respondents are known not to have access to a telephone or computer. This mode asks the mandatory questions required for a complete response. Only 25 postal responses were received during the first year of surveying. Because these responses are so few, we do not discuss the paper-based mode very much in this report.

¹²¹ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/data-collection>

¹²² See <https://www.hesa.ac.uk/definitions/operational-survey-information>

¹²³ This remains an unpublished internal document at the time of writing.

However, we are aware of the additional potential hidden within the various markers in the system, which could yield additional formally catalogued paradata. We are keen to use it to support operational improvements, as well as to investigate mode effects. A paradata team has been formed with a remit to develop and catalogue paradata, and we have been engaging with microdata users about the paradata variables they would find most useful. We have steadily increased the number of paradata variables available and developed a routine to process these into our data warehouse. We have evaluated data quality for some variables and are endeavouring to improve the specification of them to a point where they become useful for case prioritization. Our work has helped us develop deeper understanding of respondent behaviours and characteristics, and non-respondent characteristics.

One of the key considerations in our quality analysis work is therefore the mode of data collection, which must work to maximise the response rate of the survey whilst also allowing high quality data to be collected. The use of multiple modes can increase representativeness but can also lead to measurement error¹²⁴. For instance, telephone interviews are important in increasing response rates, and therefore reducing non-response, but can also increase measurement error¹²⁵, whereas the use of online self-administered surveys can help to reduce respondent burden and increase the likelihood of a graduate disclosing information that may be viewed as sensitive¹²⁶. Self-administration of a survey also makes it easier for a participant to fully process and understand a question, which can make it a more accessible option and improve the quality of answers. However, it can also be more susceptible to behaviours such as satisficing¹²⁷.

As has been briefly highlighted above, there can be many different issues with the quality of survey data and the completion mode utilised by a respondent can exacerbate these. Therefore, other forms of bias and error must be considered, especially when they may be influenced by the mode of completion. For instance, selection bias is likely to be present in the survey regardless of mode. However, the two concepts are closely intertwined in many ways and mode can be used to help increase the representativeness of the data, for example through the case prioritisation process that occurs in [Graduate Outcomes](#). Equally, confidentiality impacts social desirability bias, as bias is more likely if respondents are identified in a survey, which is relevant to Graduate Outcomes, and this effect is likely to be more pronounced if an interviewer is administering a survey¹²⁸ as is the case with the telephone interviews. Throughout our work, analysis of various elements took place to determine any changes in response patterns or question non-response. For each area, the possible reasons for changes were assessed and consideration was made to factors such as the cognitive load placed upon participants, the potential for misinterpretation, social desirability bias, satisficing and the potential for primacy and recency effects, among other things, to help describe some of the patterns in the data. These can all be influenced by mode in different ways that we may not expect. For instance, in terms of primacy and recency effects, telephone interview respondents are more likely to provide the answer that they heard last, whereas online self-completion respondents are more likely to select the first option¹²⁹.

Our work on mode effects has concentrated in the first instance on particularly sensitive data items: subjective wellbeing, salary, and location. We therefore present most of this analysis in the

¹²⁴ (Kocar and Biddle, 2020)

¹²⁵ (Chang and Krosnick, 2010)

¹²⁶ (Brown et al., 2008)

¹²⁷ (AAPOR, 2010)

¹²⁸ (Kocar and Biddle, 2020)

¹²⁹ (Chang and Krosnick, 2010; Kocar and Biddle, 2020).

following section. However, in summary, modal effects seem to have reduced between years for anxiety, which could perhaps be an indication of a reduction in confusion in the online mode, but could also be caused by other factors. However, there is a bigger disparity in positively worded questions, which could be influenced by social desirability bias and pandemic effects. Anxiety levels have risen for telephone interviews. This is possibly because people now see it as more socially acceptable to provide higher ratings to the interviewers due to the Covid-19 pandemic; whereas in the past people may have felt more comfortable providing a higher anxiety rating online than through a telephone interview. Research suggests that underreporting of sensitive issues is likely to be lower both when it becomes more socially acceptable and when there is less stigma associated with a topic¹³⁰.

Our current view is that data quality could benefit from some further completion mode analysis considering primacy and recency effects and the influence of the mode of completion¹³¹. Equally, mode analysis could benefit from the inclusion of characteristic data, to check whether effects are influenced by the characteristics of the graduates completing on a certain mode. This will be particularly relevant if, for example, significant methodological changes are made to the way different modes of data collection are used in the survey. These steps will form part of the continual monitoring and improvement of the survey data in future.

3.2.8. RELIABILITY OF SENSITIVE DATA

The Graduate Outcomes survey collects data on a number of topics which might be considered sensitive. In the case of both salary data and subjective wellbeing (SWB) data, there is a risk of social desirability bias, inasmuch as respondents might be expected to assume that some responses (such as higher salaries and generally positive SWB scores) are more favourable than others. Given that data on both of these topics is reported back to HE providers – although SWB data is only returned to providers in aggregate – there is some possibility that respondents will feel an incentive to answer questions about salary and SWB in such a way as to create a more favourable impression of how they are doing 15 months after course completion. In order to ascertain whether these potentially sensitive areas are subject to an elevated risk of misreporting, HESA has therefore undertaken a range of quality checks¹³². Respondents can be wary of offering precise location information because of privacy concerns. Location is therefore another potentially sensitive data item that we have added to our priorities for analysis. Feedback from users during the first year of operation highlighted the importance of location data, and we have committed to improving quality here. One element of this has been to try to understand what impact mode effects and related error might be having on the quality of these sensitive data items, during fieldwork.

In this section we first offer a discussion of our overall conclusions from the analysis, before covering the analysis itself in more detail in the following three subsections.

Assessment of a dataset, particularly in response to survey changes, forms an important part of the quality analysis process. Indeed, each of the three areas analysed in this report had alterations made to them in year two which contributed towards an improvement in the quality of the data provided in response to the questions. This highlights the value that regular review of survey questions and data can provide. In terms of subjective well-being and salary, the analysis indicates

¹³⁰ (McNeeley, 2012)

¹³¹ (Chang and Krosnick, 2010; Kocar and Biddle, 2020)

¹³² For details of the various kinds of respondent error that we consider salient to Graduate Outcomes, see section 3.2.6.1. Respondent error.

that improving the clarity around either question wording or scale can improve the reliability of the responses provided to the question. Equally, postcode analysis provides interesting results relating to the value of adding validation to free-text fields, as it seems that it aids in encouraging higher quality responses without increasing non-response too significantly.

Additionally, the analysis provides insight into the mode effects that may be influencing the data. In the analysis of subjective well-being data, it appeared that whilst mode effects had decreased for the anxiety question, they had increased slightly for the three positively worded questions. However, mode effects were still smaller overall for the three positively worded questions than the anxiety question. This highlights the complexities involved with analysing mode, but also indicates that steps can be taken to mitigate against mode effects to a certain extent. For instance, overall, higher quality data is received for postcode on the online mode than for telephone interviews, but telephone interviews also saw the biggest improvements in year two. The use of telephone interviews is invaluable in increasing response rates, so taking steps like this to aid in reducing any measurement error that may occur as a result of utilising this mode is important¹³³. Participants were generally more likely to provide information to a question online, with higher levels of response for salary and postcode in this mode. This is to be expected, as self-administration of a survey increases the likelihood of a person disclosing information¹³⁴. However, the quality of the data is not always higher, for example there were higher levels of misinterpretation and straight-lining online for the subjective well-being questions and, even with larger improvements in data quality for salary, online still had higher levels of graduates selecting one or two figure salaries. Whilst improvements are clear, there is arguably more that could be done in future to improve the dataset and reduce mode effects further.

In terms of the subjective well-being questions, although positive effects have been seen due to the changes, it is important to consider further areas for improvement. In relation to the questions, there may still be further possibilities for improvement of the layout. Although they are not in a grid format, the fact that they follow on from each other could still be contributing to an assumption of scale¹³⁵. Scale labels could also be changed, as at present the happiness and satisfaction questions still utilise the word 'extremely'. This could be brought more in line with other surveys utilizing the four ONS subjective well-being questions and may help to improve the interpretation and understanding of the scale further.

For salary, it is important to ensure that graduates are aware of the relevance of the salary question and that interviewers remain trained to improve the responses received to the question through the telephone mode. Equally, review will continue to determine if there are further steps that can be taken to improve validation or clarity in the question.

Next steps for improving postcode quality will consider methods for reducing the numbers of 'Don't know' responses further and attempting to reduce the percentage of graduates who do not answer the question. Equally, consideration may need to be made of responses where the town/city question is optional now that postcode validation is in place and seems to be improving the data quality. Indeed, as validation requires a correct postcode, it may be the case that there is no longer a requirement to collect city if postcode has been collected, especially whilst city is a free-text field. In that case it could be removed to reduce the burden on participants and decrease the risk of drop-out. Therefore, detailed analysis comparing the responses received for the postcode and the city question could be a useful next step for improvement. This will also help to confirm the quality

¹³³ (Chang and Krosnick, 2010)

¹³⁴ (Brown et al., 2008)

¹³⁵ (DeLeeuw, 2018)

of the survey data. Changes were also made to the town/city question in year 3 to simplify the question wording. Previously, the question asked the graduate to provide the town, city or area in which they worked. It has now been simplified to ask the graduate for the nearest city or town to their place of work. Assessment of improvements in responses because of these changes will also contribute towards the quality assurance of location data.

More broadly, data quality could benefit from some further completion mode analysis considering primacy and recency effects and the influence of the mode of completion¹³⁶. Equally, mode analysis could benefit from the inclusion of characteristic data, to check whether effects are influenced by the characteristics of the graduates completing on a certain mode. This will be particularly relevant if, for example, significant methodological changes are made to the way different modes of data collection are used in the survey. These steps will form part of the continual monitoring and improvement of the survey data in future.

We now turn to explain the details of our analysis and what we discovered for salary, SWB, and location data in turn, in each of the following three multi-part subsections.

3.2.8.1 Salary data

As part of the quality assurance process for the first year of Graduate Outcomes salary data, HESA conducted a series of comparisons between Graduate Outcomes and Longitudinal Educational Outcomes (LEO) salary data in order to check that the Graduate Outcomes salary data was not showing any unexpected patterns.¹³⁷ Although there are some key differences between the two datasets, including the fact that LEO does not distinguish between full- and part-time earnings, the comparisons still allowed us to see that the Graduate Outcomes salary data exhibited the trends which we would expect. Looking at the 2017/18 tax year, LEO data showed that median graduate earnings a year after graduation were £19,700 for females and £21,000 for males. Median Graduate Outcomes salaries for holders of first degrees were slightly higher, with females earning £22,000 and males earning £24,000, but the difference in earnings between male and female graduate in the two surveys is roughly equivalent. A comparison between Graduate Outcomes salary data by JACS (Joint Academic Coding System) subject and equivalent LEO data likewise showed broad similarities, with both datasets showing graduates with degrees in medicine and dentistry earning the highest salaries and graduates with degrees in creative arts and design earning the lowest salaries. A further comparison between these data sources cross-tabulated by SOC major groups again showed similar patterns.

An assessment of the salary data collected in year one of Graduate Outcomes led to some changes to the salary question in an attempt to improve the quality of the data. One concern was that graduates were misinterpreting the phrase 'to the nearest thousand', for example, by seeing it a request for a one or two figure response. This led to the removal of this wording from the question. Previously, the question also had two separate validation pop ups which could exacerbate effects such as respondent fatigue. One pop up was removed entirely and the other was edited to clarify the amount entered by the graduate with a pound sign in front of it. This aimed to improve the overall quality of the salary data, both by ensuring one or two figure responses were

¹³⁶ (Chang and Krosnick, 2010; Kocar and Biddle, 2020)

¹³⁷ For the LEO data used in these comparisons, see Department for Education (2020), *Graduate Outcomes (LEO): employment and earnings outcomes for higher education graduates by subject studied and graduate characteristics in 2017/18*.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/874410/2020_03_HE_LEO_main_text.pdf

lessened but also by reducing the provision of salaries that were too low or too high due to an unnoticed error by a graduate.

Mode of data collection can impact the responses provided to a question, especially where the information may be viewed as sensitive in nature to the graduate. Salary data is often seen as sensitive. Therefore, split by mode is included in the following analysis. Online can be seen as more confidential mode of data collection and may receive more responses¹³⁸. Indeed, other factors such as the identification of a graduate, for example in a personalized salutation in an email, can increase response rates to a survey overall, but has also been found to increase bias and decrease response rates in questions such as salary¹³⁹.

Additionally, the rapid impact of the pandemic on the economy, lifestyles, and employment¹⁴⁰ increases the importance for quality analysis on the salary responses to the survey. Checks will aim to ensure that graduates were still entering salary correctly wherever possible and that the quality of responses received to the question was not negatively impacted.

3.2.8.1.1 Assessment of non-response to salary

Question non-response is an important consideration in survey data quality and can be closely intertwined with other selection and mode effects. Item non-response can be caused by a number of factors, but graduates are less likely to answer difficult or sensitive questions¹⁴¹. This may also lead to higher levels of drop out overall. To begin to assess item non-response for salary, the percentages of blank salaries are below for paid work or self-employed full-time graduates who have answered currency as United Kingdom £ in cohort D, split by mode. This aims to give an indication of non-response to the salary question and to determine if there are mode effects at play.

Table 7 Highlighting differences in non-response to the salary question in Cohort D, by mode

Completion Mode		Cohort D Y1 %	Cohort D Y2 %	Difference
CATI	Salary Blank	6.04%	9.37%	3.33%
CATI	Salary Answered	93.96%	90.63%	-3.33%
Online	Salary Blank	4.62%	4.10%	-0.52%
Online	Salary Answered	95.38%	95.90%	0.52%

Although the online mode has seen a reduction in blank salaries, telephone interviews have seen a larger increase in blank salaries comparably. Further analysis in this report assesses if the extra data collected online is likely to be of a high quality. For telephone interviews, the numbers not

¹³⁸ (Brown et al., 2008)

¹³⁹ (Joinson et al., 2007)

¹⁴⁰ (Sułkowski, 2020)

¹⁴¹ (Loosveldt and Billiet, 2002)

responding are still relatively low for such a large survey, however non-response has clearly increased.

Boxplots can help to identify outliers and to highlight the layout of the data further and are therefore useful in visualising salary responses. They can also be useful in ensuring that data is consistent between modes and can provide extra visual reassurance that potential mode effects and increases in non-response have not negatively impacted the data. The boxplots below indicate salary split by mode, using data from Cohort D of year one and year two and outliers are not shown.

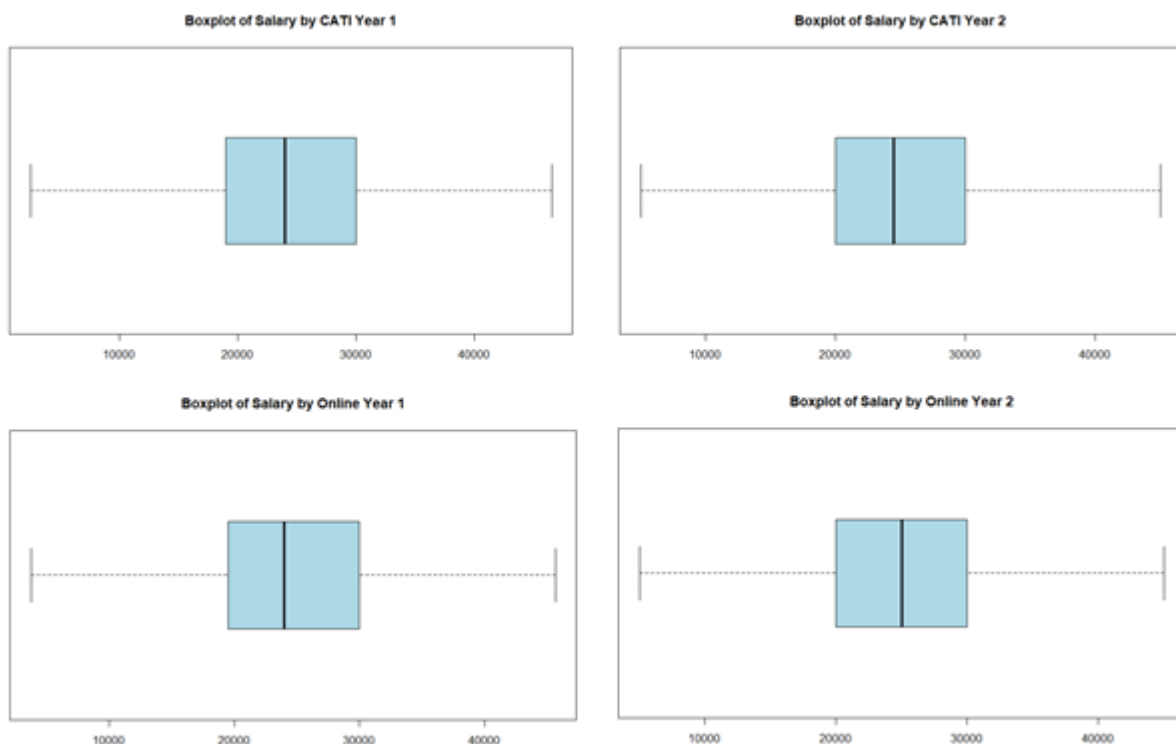


Figure 1 Boxplots of Cohort D salary responses, split by mode and year

The boxplots highlight some slight differences, but in general salary is consistent across modes and salaries appear to have risen slightly in both modes between year one and year two.

Additional analysis has been performed on blank salaries below. In the survey, the text preceding the currency question may warn the participant that they are about to be asked about their salary. The following analysis attempts to determine if the trends between telephone and online are a result of graduates feeling less inclined to provide their salary on the telephone mode, or if it is a result of graduates on the online mode being able to pre-empt the question and therefore not answering their currency either. As a result, this analysis utilizes employment basis, the question before the salary and currency question, to determine response rates where graduates have not yet seen the following question. As employment basis is only asked of graduates who are contracted to start work or in paid work for an employer, this analysis is only completed on graduates in paid work for an employer. For a fair comparison, this will be compared to only those graduates who are in paid work for an employer who have answered currency as UK £, to determine whether there are any issues.

Table 8 Highlighting differences in non-response to the salary question in Cohort D for graduates in paid work for an employer, where employment basis has been answered and with no filter by currency

Completion Mode		Cohort D Y1 %	Cohort D Y2 %	Difference
CATI	Blank	10.34%	12.51%	2.17%
CATI	Salary Blank	89.66%	87.49%	-2.17%
Online	Blank	7.22%	7.07%	-0.15%
Online	Salary Blank	92.78%	92.93%	0.15%

Table 9 Highlighting differences in non-response to the salary question in Cohort D for graduates who are in paid work for an employer, filtered by currency in UK £

Completion Mode		Cohort D Y1 %	Cohort D Y2 %	Difference
CATI	Blank	5.68%	8.76%	3.07%
CATI	Salary Blank	94.32%	91.24%	-3.07%
Online	Blank	4.48%	3.97%	-0.51%
Online	Salary Blank	95.52%	96.03%	0.51%

The two tables above highlight that when considering graduates who have answered employment basis, the online percentage difference is slightly closer to the telephone interview percentage difference for non-response. However, online still has far fewer blank salaries than the CATI mode. This highlights that it is unlikely that the difference is a result of graduates on the online mode being prewarned that the next question will be about their salary and therefore feel disinclined to answer currency.

3.2.8.1.2 Assessment of one and two digit salaries

The changes that were made to the salary question aimed to help reduce the number of one or two figure salaries provided by graduates in full-time employment due to the previous wording of the question. It was considered possible that graduates were interpreting the request for salary 'to the nearest thousand' as a request for graduates to provide one or two figures for their salary (for example, if a graduate had a salary of £20,000, they may enter '20' as their response). The following table compares graduates who responded with figures under £100 in year one against year two, split by mode. To ensure that reductions were not just a result of fewer graduates selecting a salary of £0 these were separated from the one and two figure responses in the table.

Table 10 Highlighting the percentage of one or two figure responses in cohort D of year one and year two

Completion Mode		Year 1 %	Year 2 %	Difference
CATI	£0	0.98%	0.76%	-0.22%
CATI	£100 or Over	98.77%	99.11%	0.34%
CATI	Under £100	0.25%	0.13%	-0.12%
Online	£0	0.28%	0.38%	0.10%
Online	£100 or Over	96.53%	99.03%	2.50%
Online	Under £100	3.18%	0.58%	-2.60%

There has been a decrease in one and two figure responses in both modes, but particularly online. Interestingly, the online mode has seen a slight increase in responses of £0, although the numbers are very small. It is also worth noting that, for various reasons, it is expected that there will be a certain number of graduates who respond with figures of under £100.

3.2.8.1.3 Assessment of low salaries

For graduates who have said that they are working full-time, it is expected that they should be earning above a certain amount based on minimum wage. The changes made in year two aimed to reduce confusion and to encourage graduates to think about their response to the question, in order to improve the quality of answers. It was also considered possible that the wording was also making people think that they needed to provide salary in some other format, and as a result these graduates may therefore not be pulled into the previous assessment. An arbitrary selection of £15,000, which is slightly less than the expected minimum annual wage for a full-time employee in the UK, is used in the following table to indicate salaries that may be deemed as 'too low', and therefore may have quality issues.

Table 11 Responses to salary either under or above £15,000 in Cohort D, split by mode

Completion Mode		Cohort D Y1 %	Cohort D Y2 %	Difference
CATI	£15,000 or Over	91.48%	92.41%	0.93%
CATI	Under £15,000	8.52%	7.59%	-0.93%
Online	£15,000 or Over	90.57%	93.18%	2.61%
Online	Under £15,000	9.43%	6.82%	-2.61%

Both modes have seen a reduction in the percentages of graduates stating that their salary is under £15,000, which is a positive indication that quality has improved. Improvement is greater in the online mode.

3.2.8.1.3 Assessment of high salaries

There are also graduates who enter very large numbers in response to salary, perhaps to avoid answering the survey or due to confusion causing them to add extra digits to their salary. It is hoped that these numbers will have reduced, although they are relatively small regardless.

Table 12 Responses to salary either under or above £100,000 in Cohort D, split by mode

Completion Mode		Cohort D Y1 %	Cohort D Y2 %	Difference
CATI	£100,000 or Under	99.73%	99.74%	0.01%
CATI	Over £100,000	0.27%	0.26%	-0.01%
Online	£100,000 or Under	99.58%	99.59%	0.01%
Online	Over £100,000	0.42%	0.41%	-0.01%

Changes between years are minimal, as may be expected due to the small figures already included in this group. However, there has still been a slight reduction in both groups

Our salary distribution results in a high positive skewness and high kurtosis. Although this will generate a relatively large proportion of extremely high values, high kurtosis values for positive skewness "appear to be important in the modelling of income."¹⁴² However, the previous approach to trimming the top 1.5% of salaries, while at a comparatively high level, excluded a significant absolute number of plainly credible graduate salaries, for example for graduates from professional postgraduate courses with considerable pre-existing work history. It is generally accepted that analysing extreme earnings is difficult through survey based data¹⁴³ but given the other quality characteristics of the data in (in terms of overall numbers and rates or responses, low observable bias and representativeness) we expect this will not be a problem encountered with Graduate Outcomes data. HESA has therefore taken the decision to trim only 0.1% of extremely high values in recognition of user preferences for more comprehensive data on higher salaries. We are also amending our salary banding approach to make the kurtosis and skewness of the data more apparent to users. Users of the Graduate Outcomes microdata will need to consider their treatment of extreme values, and especially whether they choose to trim salary data further at the highest end of the distribution.

3.2.8.1.4 Conclusions on salary data quality

Positively, non-response reduced in the online mode for salary, with an increase in responses to the salary question. This is a positive outcome and could be a result of many factors, possibly including the question being clearer, increased publicity and knowledge of Graduate Outcomes

¹⁴² (McDonald et al, 2013)

¹⁴³ (Office for National Statistics, 2015)

leading to increased trust, or an increased feeling of privacy when answering online¹⁴⁴. However, there was an increase in non-response to salary for telephone interviews of 3.33%. This may be a result of the pandemic, as there may be graduates who are not sure of their salaries or who are more wary of sharing their full income with an interviewer, especially given the circumstances that were surrounding employment, with the implementation of the furlough scheme and loss of business for many. With increased sensitivity, it seems likely that graduates would be less inclined to disclose this information to an interviewer¹⁴⁵. We will keep this under review to observe any other patterns of respondent behaviour that may explain the differences, including any signs of an increase in item non-response. Due to the layout of the salary and currency questions, and the analysis being based on currency being answered, the possibility that the difference between telephone and online was due to graduates dropping out before currency in the online mode was considered. A separate analysis based on employment basis being answered was completed and it was determined that the difference was not due to graduates dropping out earlier and it is more likely that this is a mode effect. Indeed, this is to be expected, as a reluctance to disclose sensitive information such as salary over the phone is common and the use of an online mode can increase a participant's likeliness to disclose sensitive information¹⁴⁶. Therefore, it may be expected to see increased disclosure of salary in the online mode, and therefore a more complete dataset, so these results are not surprising.

Changes that were made aimed to improve the quality of the salary data. Both modes saw a decrease in one and two digit responses, but online saw the biggest decrease. This is a positive improvement, which could be a result of the changes that were implemented to the salary question with this aim, particularly as the biggest effect was seen for the self-completion mode. Interestingly, online also saw a slight increase in responses of £0. The change was very small but could perhaps be an impact of the pandemic or graduates not feeling as comfortable sharing their information. In terms of low salaries, reductions were seen for both modes. Again, there was a greater impact on the online self-completion mode which is a positive indication of an improvement in data quality because of the changes. For salaries of over £100,000 the changes were minimal, although there was a very slight reduction for both, and numbers were previously low regardless. Overall, the data has seen improvements and results point to a reduction in responses that may have been a result of confusion caused by the wording of the question.

3.2.8.2 Subjective wellbeing data

Subjective well-being is a self-reported measure which provides an indication of a person's overall feelings at a particular time¹⁴⁷, and can therefore be considered as a useful metric in building a wider understanding of a graduate's life. The subjective wellbeing section of the Graduate Outcomes survey features four questions set by the Office for National Statistics (ONS) and offers a standardised measure of wellbeing across years and surveys. The first three questions cover life satisfaction, life worth and happiness and are all positively worded with a scale running from 0-10, where 0 indicates negative feelings. Conversely, the final question on anxiety is a negatively worded item, where 0 indicates a more positive outcome.

The previous edition of this report contains details of our initial investigations into SWB variables in more detail. This edition summarises these before offering new insights from our quality analysis.

¹⁴⁴ (Lensvelt-Mulders and Boeije, 2007)

¹⁴⁵ (Kocar and Biddle, 2020)

¹⁴⁶ (Brown et al, 2008)

¹⁴⁷ (Dolan et al., 2008)

An assessment of year one Graduate Outcomes data concluded that due to the reverse coding of the anxiety question, which follows on from the first three positively worded questions, there was potentially some misinterpretation of the scales occurring. Indeed, both assumptions about the intent of a survey and a reverse keyed item following on from questions using a scale in the opposite direction, can lead to increased mis-response to reversed items¹⁴⁸ and previous research has found that the final ONS well-being question does have the potential to confuse respondents¹⁴⁹. Therefore, to reduce the risk of both confusion and straight-lining some changes were implemented in year two, including the removal of the additional wording clarifying the scale for the first three questions. It was hoped this alteration would make the additional wording stand out for the anxiety question by highlighting the change in direction of coding. It also brought the questions more in line with other surveys utilising the ONS harmonised questions. The impact of these changes will be assessed in this report.

Further to this, quality work last year featured some analysis of subjective well-being by completion mode. The following report includes assessment of the effect of survey mode on subjective well-being data, which was also referenced as the next step for research in the 2020 Graduate Outcomes survey quality report. This is an important line of research that can impact all areas of the subjective well-being questions. Traditionally, the ONS subjective well-being questions have not been administered through an online mode, therefore it has been even more important to assess the questions to ensure that they are appropriate in terms of layout and wording. Online surveys have been found to increase the speeds at which participants answer questions, and grid questions can encourage lower levels of concentration and the straight-lining of responses¹⁵⁰. Equally, social desirability bias can come into play for sensitive questions and for questions administered by an interviewer¹⁵¹. These effects will be considered in the following analysis.

3.2.8.2.1 Straight-lining in SWB questions

There are numerous reasons a graduate may straight-line, including misinterpretation, satisficing or survey fatigue. It can occur in different forms, but this analysis will be based upon the non-differentiation of responses in the scores provided to the subjective wellbeing questions. Straight-lining can be quite evident in some areas of the Graduate Outcomes survey due to the reverse wording of the final subjective-wellbeing question, however, responses may still be valid where it has occurred. It can be harder to spot an issue if a large proportion of the population has scored towards the midpoint of the scale as this can lead to higher levels of valid straight-lining, but in general it is considered to be one of the most important indicators of survey data quality¹⁵².

The following table highlights the levels of straight-lining in the Graduate Outcomes survey by mode and year.

¹⁴⁸ (Weijters et al., 2013)

¹⁴⁹ (Ralph, Palmer and Olney, 2011)

¹⁵⁰ (DeLeeuw, 2018)

¹⁵¹ (Duffy et al., 2005)

¹⁵² (Reuning and Plutzer, 2020)

Table 13 Levels of straight-lining in Graduate Outcomes in Cohort D of year one and year two

Completion Mode		Year one %	Year two %	% Difference
CATI	Not Straight-lined	99.21%	99.24%	0.03%
CATI	Straight-lined	0.79%	0.76%	-0.03%
Online	Not Straight-lined	97.16%	96.84%	-0.31%
Online	Straight-lined	2.84%	3.16%	0.31%

The table above highlights that straight-lining has decreased for telephone interviews but appears to have increased slightly for the online completions in year two. However, the numbers are still particularly low given the overall size of the population.

To delve further into the results illustrated above, the figure below indicates the numbers of graduates straight-lining for both years split by mode. Due to the overall increase in response rate in year two the numbers are higher, but this offers an insight into the distribution of straight-lining responses.

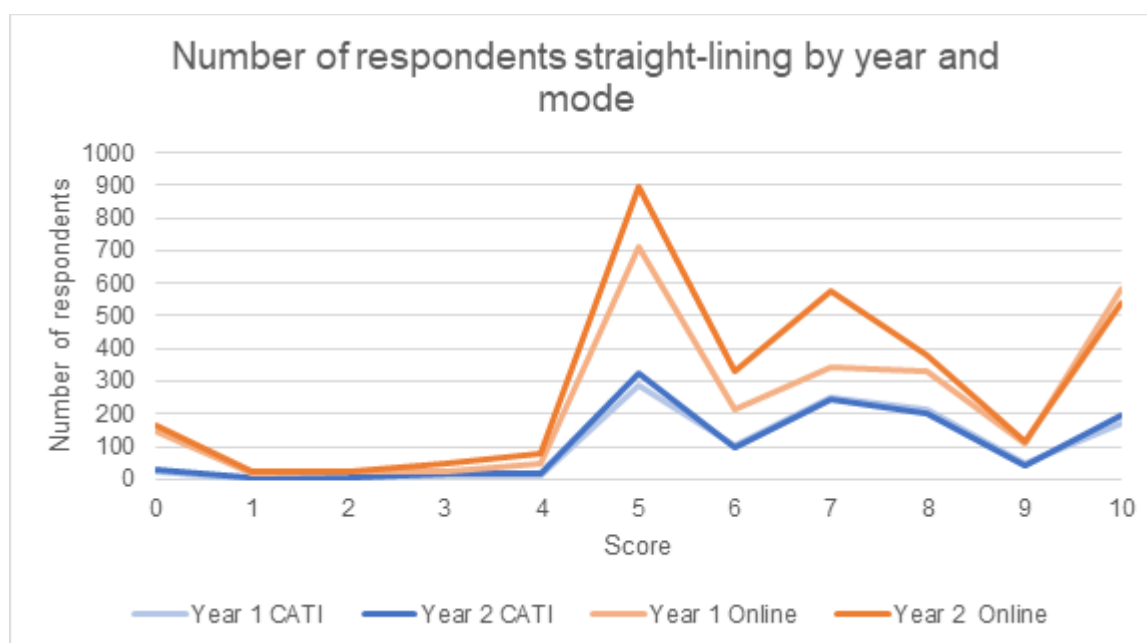


Figure 2 An illustration of straight-lining responses across cohort D of year one and two of the survey, split by mode

As can be seen, there are higher levels of straight-lining for certain scores in the Figure above, particularly the scores '5', '7', '8' and '10'. However, though useful, this does not explain whether higher numbers of graduates are selecting these scores overall, regardless of straight-lining. To aid in understanding straight-lining a little better, the following Figure illustrates straight-lining levels

when corrected by the common scores provided to the subjective well-being questions. The percentage of responses received for each score across Cohort D is used to calculate the expected distribution of straight-lining at each particular score, and the difference between the expected and actual values are plotted below. This helps to determine if straight-lining is higher than expected based on the normal distribution of scores provided.

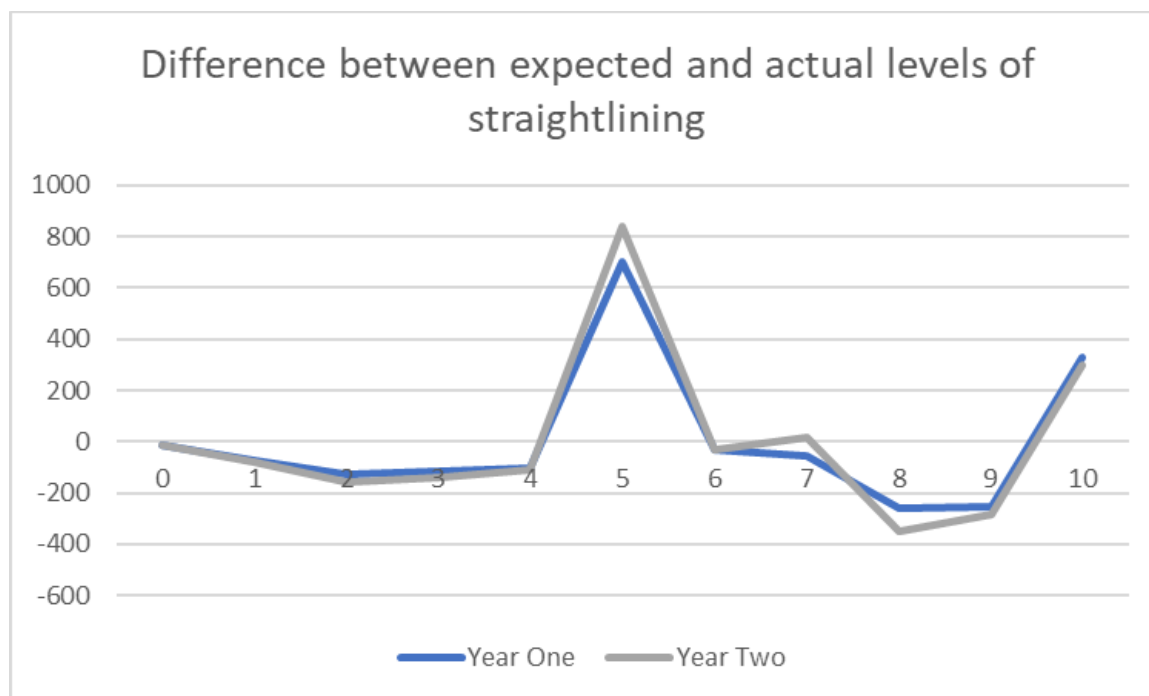


Figure 3 Straight-lining in cohort D of year one and two, corrected by the frequency of scores selected for the subjective well-being questions

As can be seen, straight-lining is still particularly high at points '5' and '10', which are scores that would be more commonly expected for non-differentiation of responses. Indeed, when considering a potential valid straight-lining response, '5' is the value we would most expect to be selected and score of '10' may be more likely to be selected due to satisficing and an assumption of scale. However, the Figure above also illustrates that the peaks seen in the preceeding Figure at scores of '7' and '8' are not as concerning as they may have initially seemed, as these are much more commonly selected responses, and therefore there is naturally a higher chance for straight-lining to occur. This also indicates that straight lining has decreased towards the higher scores for the online mode.

As mentioned, straight-lining is often viewed as one of the most important indicators of survey data quality¹⁵³ and the removal of straight-lining can also be a useful tool in determining if there is systemic confusion present in the survey, or whether the effects are a result of satisficing or similar effects. This will be revisited later in section 3.2.8.2.3, which focuses on potential misinterpretation of the wellbeing questions.

¹⁵³ (Reuning and Plutzer, 2020)

3.2.8.2.2 Mode effects in SWB questions

Graduate Outcomes' mixed-mode methodology can help to increase response rates and reach a wider range of respondents, thereby improving the representativeness of the dataset. However, mode effects can have an impact on the data and assessing results by completion mode is important, especially as the ONS subjective wellbeing questions are not traditionally administered through online surveying. Social desirability bias is one example of a mode effect that can impact the response received to a question, especially if a survey is administered by an interviewer¹⁵⁴. This effect is likely to be more pronounced for sensitive or personal questions¹⁵⁵, and subjective well-being can certainly be considered within this group, highlighting the relevance of quality analysis on this section of the survey in particular.

Percentage distributions of the subjective wellbeing scores across each year and for each of the SWB questions, are shown in the following Figures. These are split by completion mode to illustrate differences between years and to begin to highlight possible mode effects.

¹⁵⁴ (Kocar and Biddle, 2020)

¹⁵⁵ (Duffy et al., 2005)

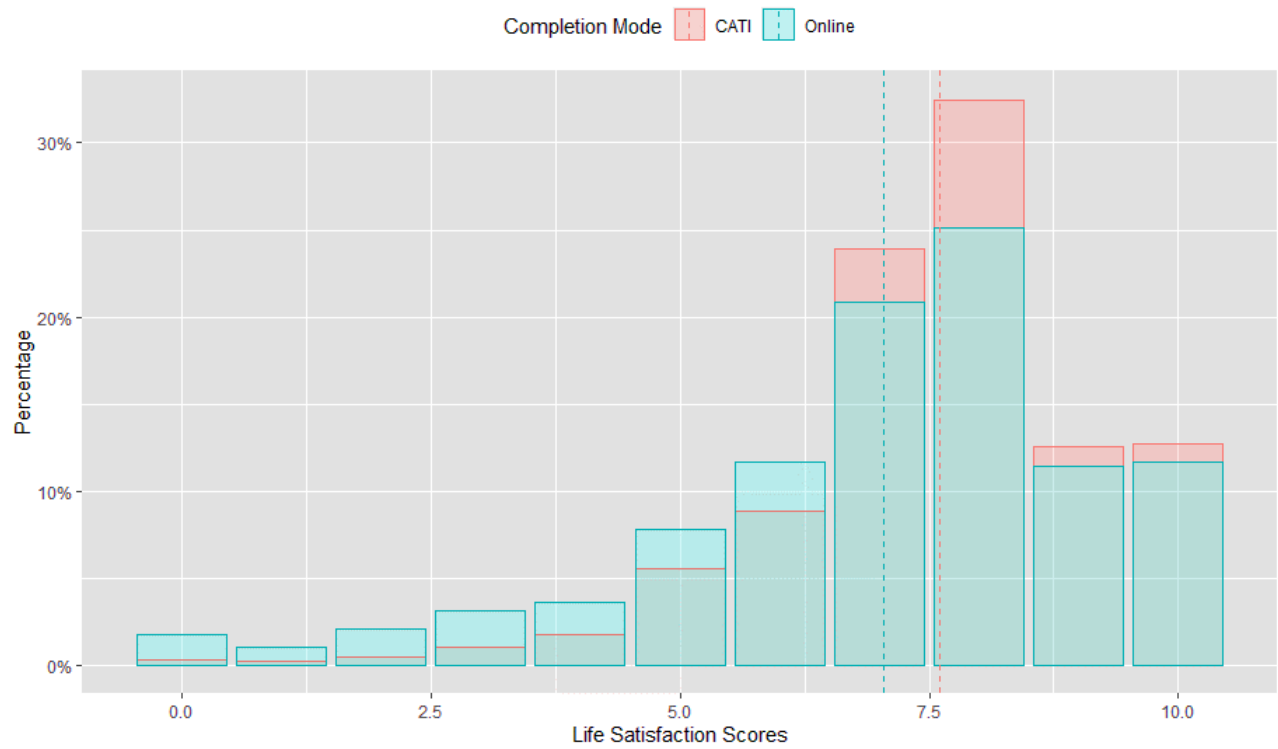


Figure 4 Distribution of Year 1 (Cohort D) Life Satisfaction scores by completion mode

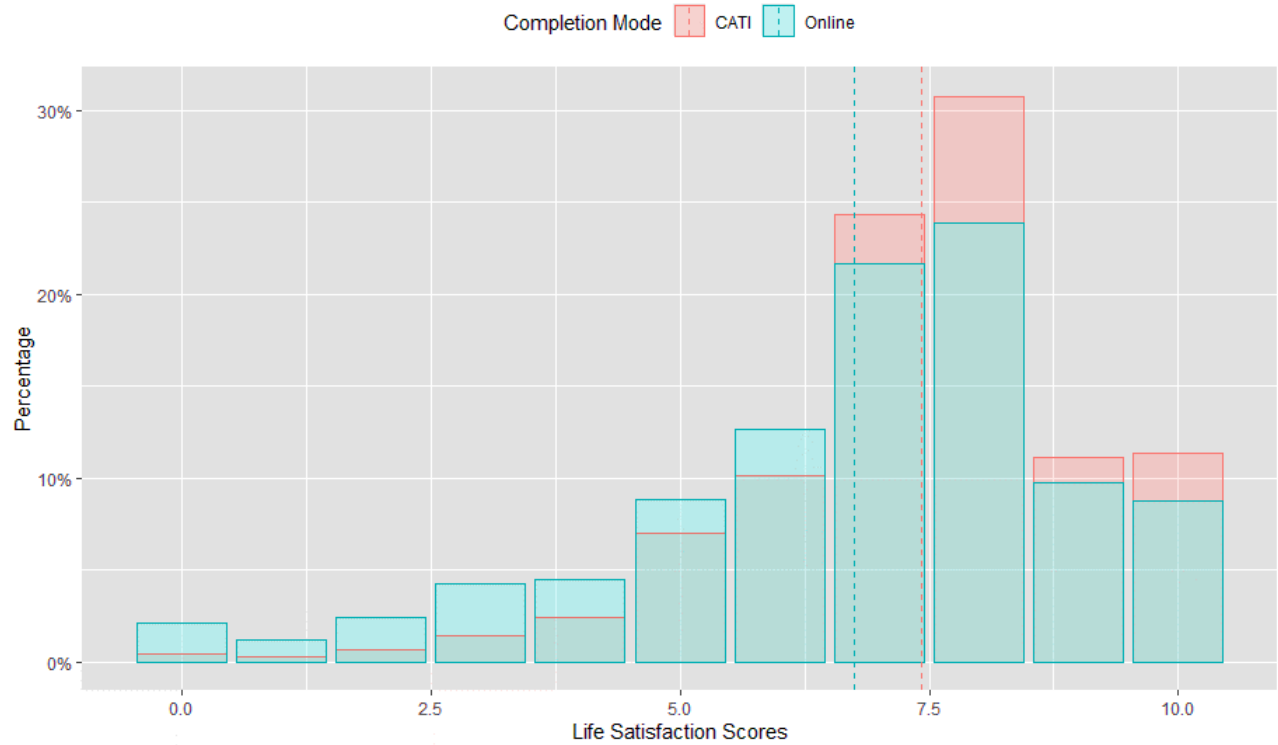


Figure 5 Distribution of Year 2 (Cohort D) Life Satisfaction scores by completion mode

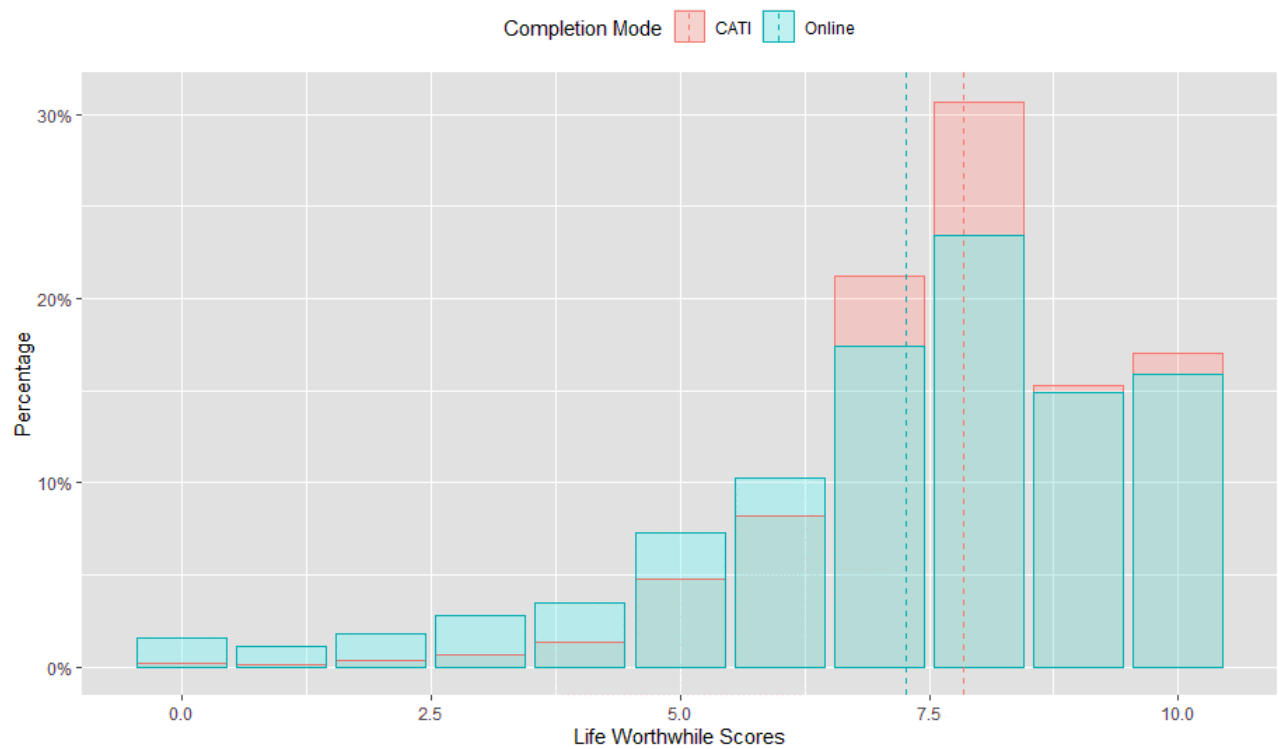


Figure 6 Distribution of Year 1 (Cohort D) Life Worthwhile scores by completion mode

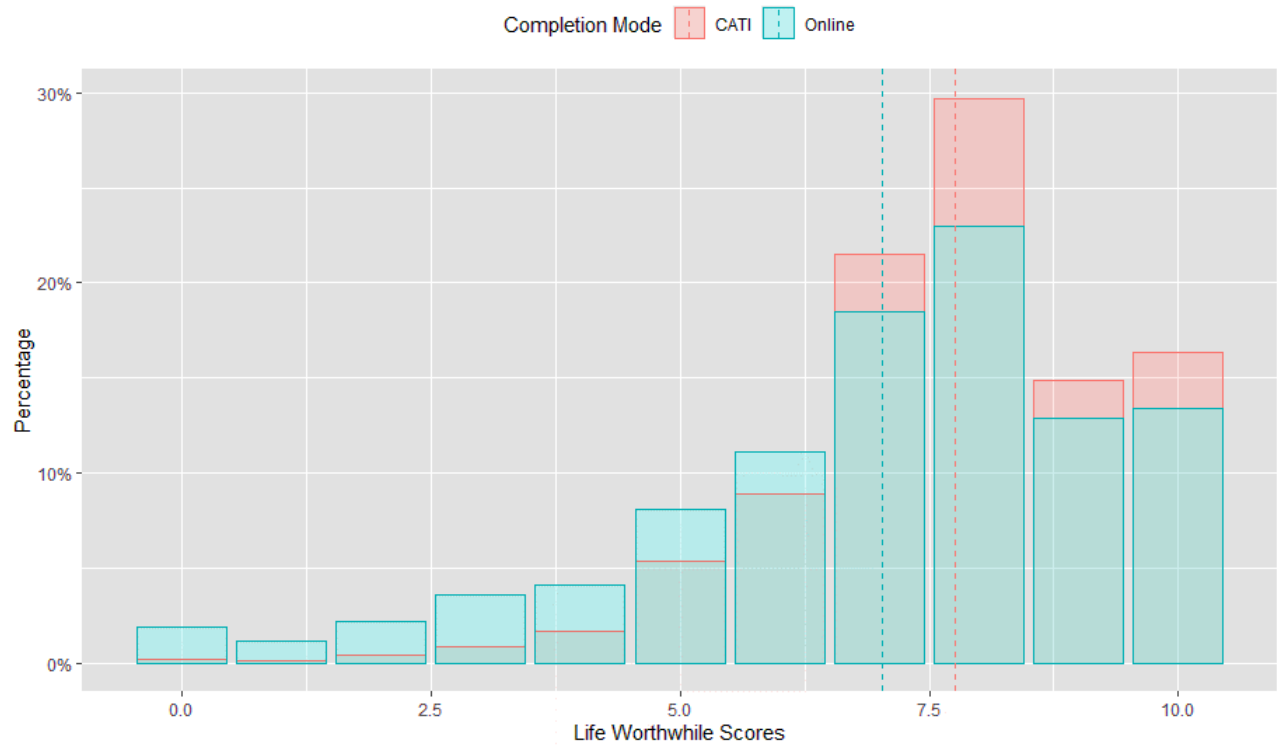


Figure 7 Distribution of Year 2 (Cohort D) Life Satisfaction scores by completion mode

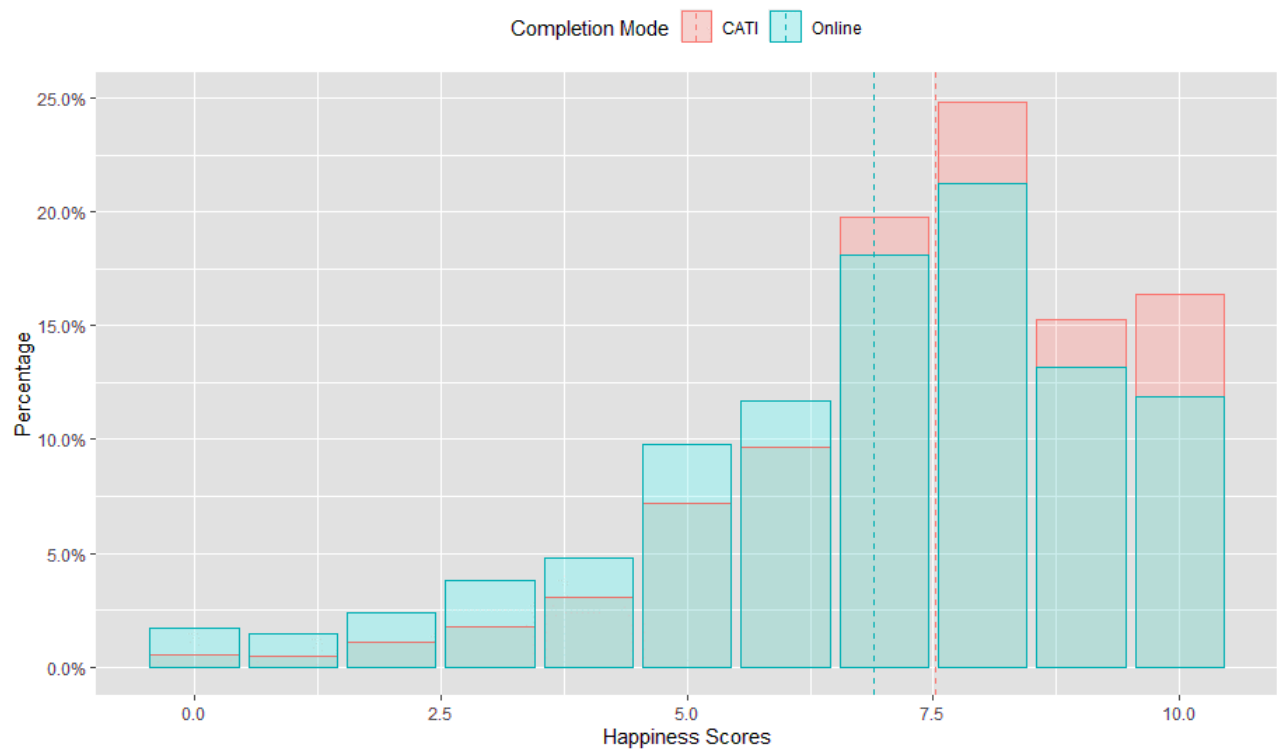


Figure 8 Distribution of Year 1 (Cohort D) Happiness scores by completion mode

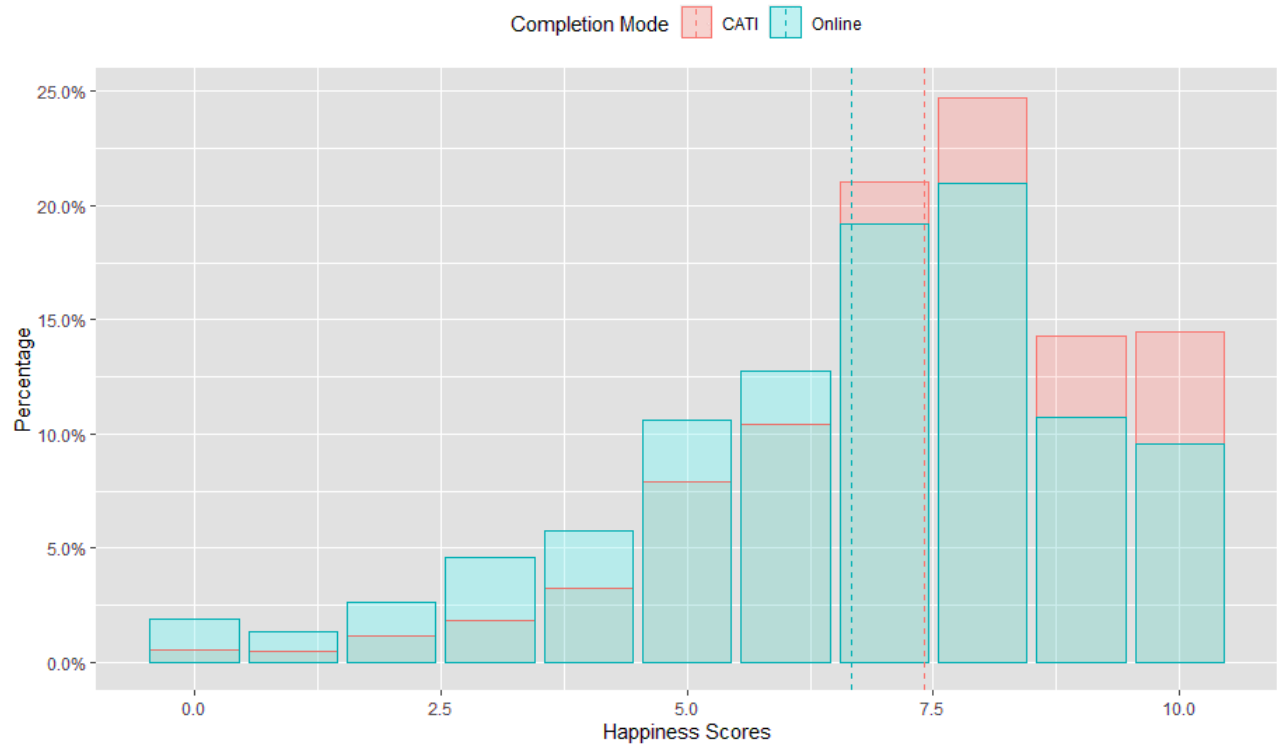


Figure 9 Distribution of Year 2 (Cohort D) Happiness scores by completion mode

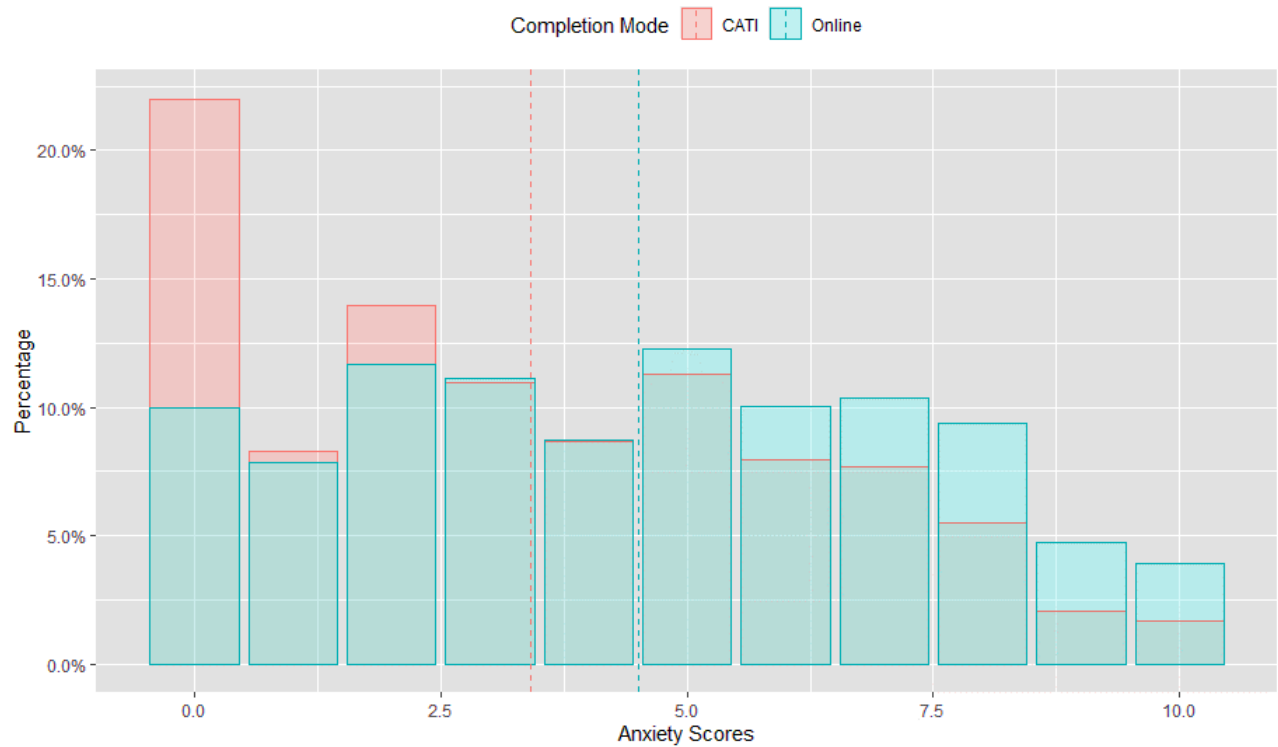


Figure 10 Distribution of Year 1 (Cohort D) Anxiety scores by completion mode

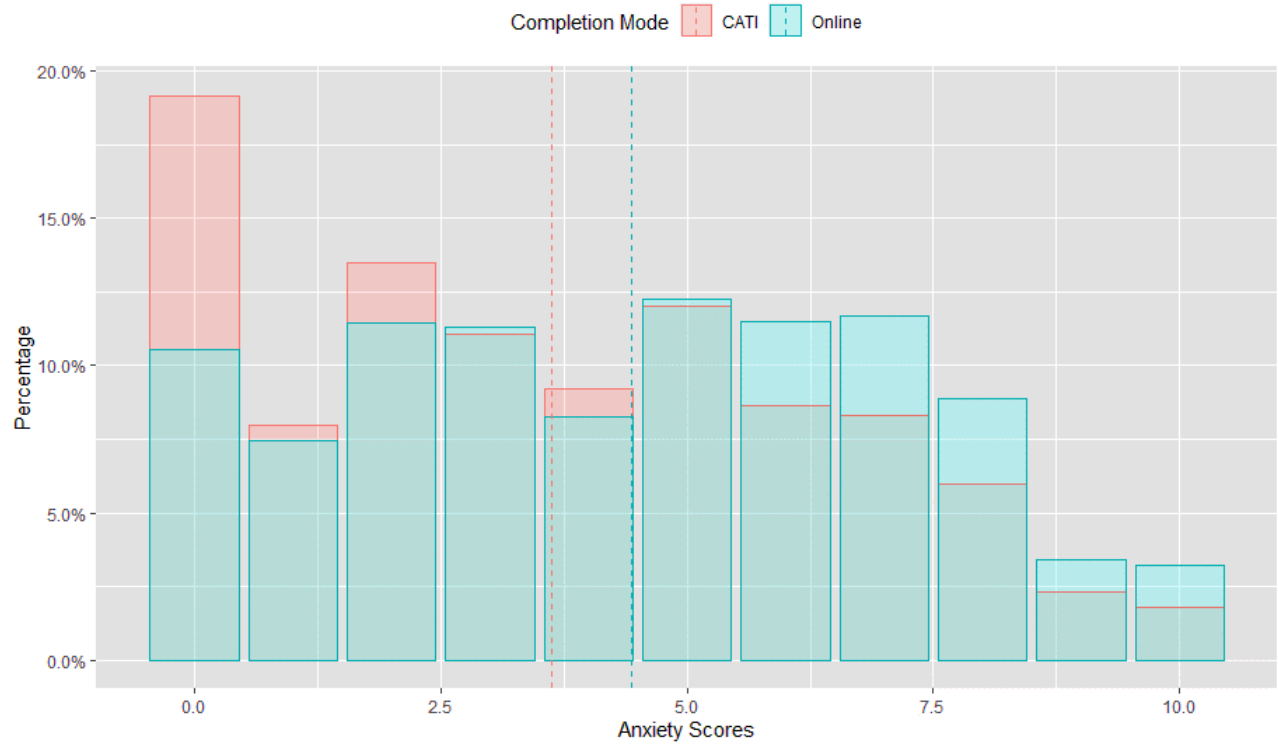


Figure 11 Distribution of Year 2 (Cohort D) Anxiety scores by completion mode

Between years, patterns in the percentage distributions seem similar for each subjective well-being question. Equally, all positively worded questions seem to follow similar trends in distribution. For anxiety, the biggest mode effect can be seen for a score of 0, which is selected far more for telephone interviews than online. It seems likely that this is a result of social desirability bias. Indeed, this seems to have impacted each question, with higher percentages of graduates selecting positive outcomes when completing through a telephone interview and more selecting negative outcomes when completing online.

Linear regression can be utilised to analyse the relationships between the completion mode used and the response provided to the subjective wellbeing questions and can help describe the differences shown in the figures above. Using completion mode as the explanatory variable and response to subjective wellbeing as a dependent variable illustrates the interactions between them. Completion mode is a categorical variable, therefore a dummy variable was created in R, where telephone was 1 and online was 0. This is an arbitrary selection but is considered in the interpretation of the coefficients. Intercept values were calculated for telephone interviews and the difference that would be expected if a graduate had completed online can be seen in the following two tables from the +/- Online value.

Table 14 Cohort D, year one telephone interview intercept values and expected difference for online completion mode

	Anxiety	Happiness	Satisfaction	Worthwhile
Intercept (Telephone)	3.41	7.52	7.60	7.84
Online	+1.09	-0.63	-0.57	-0.57

Table 15 Cohort D, year two telephone intercept values and expected difference for online completion mode

	Anxiety	Happiness	Satisfaction	Worthwhile
Intercept (Telephone)	3.62	7.41	7.42	7.76
Online	+0.82	-0.74	-0.67	-0.73

The tables above highlight the impact of completion mode on each of the subjective wellbeing responses. The 'online' amount highlights the difference that would have been expected if the graduates had completed online, compared to the average (intercept) value assigned to telephone interviews, illustrating possible mode effects at play. These results suggest that if a graduate has completed the survey online, they are more likely to score themselves as having higher anxiety levels and lower happiness, satisfaction and worthwhile levels. This is backed by existing research, such as a study by Dolan and Kavestos (2016) which finds that telephone interviews are generally associated with significantly higher levels of wellbeing. Of the positively worded questions, happiness seems to be most affected for Graduate Outcomes, with a drop of 0.69 expected for completion in the online mode.

3.2.8.2.3 Misinterpretation of the subjective well-being questions

Highlighted below are the average positively worded ratings in relation to high anxiety scores. Generally, a recoded score for a negatively worded question is expected to be similar to the average of a participants positively worded question answers. If it is not, it may be an indication of

confusion¹⁵⁶. The following table highlights the average of the positively worded ratings provided when graduates have selected high anxiety scores.

Table 16 Difference between the average positively worded question rating provided in cohort D of the survey for year one and year two for graduates who selected high anxiety scores

Average positively worded rating			
Anxiety rating	Year 1 (Cohort D)	Year 2 (Cohort D)	Difference
8-10	6.44	6.09	-0.35
9-10	6.22	5.73	-0.49
10	5.91	5.32	-0.59

As can be seen in the table above, the average of the positively worded ratings when anxiety is high has dropped in year two. This is a positive indication of a possible reduction in confusion, highlighting that the participants are likely to be understanding the question better. Equally, the reduction for each of the high anxiety groups is more than the drop in the overall average positivity rating between cohort D in year one and two when all questions were answered, which dropped from 7.43 to 7.25.

As was mentioned in section 3.2.8.2.1, which focused on straight-lining across the dataset, the removal of straight-lining participants can help to determine if there is genuine misinterpretation of the questions, or whether remaining confusion may be a result of satisficing or similar effects. When straight-liners were removed from the dataset, the average positivity rating was very similar to the ratings above, both for the overall average and for the high anxiety averages. Therefore, although removing straight-lining responses does bring the values slightly closer to the expected average, potential misinterpretation levels have reduced and the changes between years are very similar.

Indeed, comparisons of the positively worded questions and anxiety can start to indicate confusion. However, a more direct comparison is happiness and anxiety, which can be considered to be contrary statements, where both are unlikely to be true (e.g. extremely anxious and extremely happy) but both can be false (e.g. not happy and not anxious)¹⁵⁷. The following three tables highlight the overall distribution of happiness and anxiety scores provided by graduates, first overall and then split by completion mode. They only include graduates who have responded to both the happiness and anxiety questions. The tables have been reordered so that anxiety scores begin with 'high anxiety', which are scores of 6-10.

¹⁵⁶ (Józsa and Morgan, 2017)

¹⁵⁷ (Horn, 2018)

Table 17 Overall percentage happiness and anxiety scores and differences between year one and year two of the survey

Y1						Y2					
Anxiety Scores	Happiness Scores					Anxiety Scores	Happiness Scores				
		Low	Medium	High	Very High			Low	Medium	High	Very High
	High	5.81%	8.12%	11.30%	4.88%		High	6.89%	9.09%	11.62%	4.02%
	Medium	1.68%	5.30%	9.85%	3.54%		Medium	1.74%	5.94%	10.34%	2.93%
	Low	1.28%	3.24%	12.76%	6.80%		Low	1.24%	3.42%	13.10%	6.09%
	Very Low	0.95%	1.95%	8.69%	13.85%		Very Low	0.82%	1.85%	8.52%	12.38%

Difference		Happiness Scores			
Anxiety Scores		Low	Medium	High	Very High
	High	1.08%	0.97%	0.33%	-0.86%
	Medium	0.06%	0.64%	0.49%	-0.60%
	Low	-0.04%	0.18%	0.33%	-0.71%
	Very Low	-0.12%	-0.11%	-0.17%	-1.47%

Table 18 Percentage happiness and anxiety scores for telephone interviews and differences between year one and year two of the survey

Y1						Y2					
Anxiety Scores	Happiness Scores					Anxiety Scores	Happiness Scores				
		Low	Medium	High	Very High			Low	Medium	High	Very High
	High	3.74%	6.59%	10.20%	4.30%		High	4.14%	7.65%	11.23%	4.03%
	Medium	1.39%	4.90%	10.26%	3.43%		Medium	1.31%	5.40%	11.23%	3.28%
	Low	0.99%	3.17%	13.70%	7.05%		Low	0.94%	3.25%	13.68%	6.70%
	Very Low	0.78%	2.13%	10.49%	16.88%		Very Low	0.74%	2.00%	9.66%	14.75%

Difference		Happiness Scores			
Anxiety Scores		Low	Medium	High	Very High
	High	0.40%	1.06%	1.02%	-0.27%
	Medium	-0.07%	0.50%	0.97%	-0.14%
	Low	-0.05%	0.08%	-0.01%	-0.35%
	Very Low	-0.04%	-0.14%	-0.83%	-2.13%

Table 19 Percentage happiness and anxiety scores for online completion and differences between year one and year two of the survey

Y1	Happiness Scores				
Anxiety Scores		Low	Medium	High	Very High
	High	9.06%	10.52%	13.02%	5.80%
	Medium	2.14%	5.92%	9.22%	3.71%
	Low	1.74%	3.34%	11.30%	6.41%
	Very Low	1.22%	1.67%	5.86%	9.07%

Y2	Happiness Scores				
Anxiety Scores		Low	Medium	High	Very High
	High	11.15%	11.31%	12.23%	4.02%
	Medium	2.41%	6.76%	8.97%	2.39%
	Low	1.70%	3.68%	12.20%	5.15%
	Very Low	0.95%	1.61%	6.77%	8.70%

Difference	Happiness Scores				
Anxiety Scores		Low	Medium	High	Very High
	High	2.09%	0.79%	-0.78%	-1.78%
	Medium	0.26%	0.84%	-0.25%	-1.32%
	Low	-0.04%	0.34%	0.90%	-1.26%
	Very Low	-0.27%	-0.06%	0.91%	-0.37%

The majority of graduates would be expected to fall within the diagonal strips outlined in the tables above. In general, this is what is observed, although there are some areas that do not fit this trend. The tables highlight that low happiness, high anxiety responses are much more common in the online mode. There are also fewer graduates across the very high happiness groups. As mentioned in section 3.2.8.2, the changes that were made to the questions in year two aimed to reduce the levels of potential misinterpretation. There was a larger reduction in the high happiness and very high anxiety levels than any other combination for the online mode, which is a positive outcome considering that the layout and question alterations were implemented predominantly to improve responses in the online mode. There has also been a reduction in these groups for telephone interviews, which saw similar changes to the CATI script.

Happiness and anxiety are not fully antonymous, but research has found that high anxiety levels have a negative correlation with happiness levels¹⁵⁸. Although participants could genuinely score towards one end of the scale for both, it is less likely towards the high end of the scale as happiness and anxiety can be considered as a contrary statement, as mentioned previously. As a result, more reliably determining the presence of misinterpretation requires analysis to focus on the top end of the scale. The following tables focus on high anxiety and high happiness ratings, grouping from '7-10' for both questions to just scores of '10' for both. They label any graduates outside the specified ratings as 'understood' and any within as 'misunderstood'.

¹⁵⁸ (Arab et al., 2016)

Table 20 Happiness and anxiety scores both within 7-10, split by mode for cohort D of year one and two

Happy/ Anxiety Scores Seven to Ten	Completion Mode	Y1 %	Y2 %	Difference
Misunderstood	CATI	9.44%	9.70%	0.26%
Misunderstood	Online	13.09%	10.38%	-2.71%
Understood	CATI	90.56%	90.30%	-0.26%
Understood	Online	86.91%	89.62%	2.71%

Table 21 Happiness and anxiety scores both within 8-10, split by mode for cohort D of year one and two

Happy/ Anxiety Scores Eight to Ten	Completion Mode	Y1 %	Y2 %	Difference
Misunderstood	CATI	3.24%	3.14%	-0.10%
Misunderstood	Online	5.28%	3.56%	-1.72%
Understood	CATI	96.76%	96.86%	0.10%
Understood	Online	94.72%	96.44%	1.72%

Table 22 Happiness and anxiety scores both within 9-10, split by mode for cohort D of year one and two

Happy/ Anxiety Scores Nine to Ten	Completion Mode	Y1 %	Y2 %	Difference
Misunderstood	CATI	0.83%	0.76%	-0.07%
Misunderstood	Online	1.80%	1.12%	-0.68%
Understood	CATI	99.17%	99.24%	0.07%
Understood	Online	98.20%	98.88%	0.68%

Table 23 Happiness and anxiety scores both 10, split by mode for cohort D of year one and two

Happy/ Anxiety Scores Ten	Completion Mode	Y1 %	Y2 %	Difference
Misunderstood	CATI	0.30%	0.28%	-0.02%
Misunderstood	Online	0.89%	0.63%	-0.26%
Understood	CATI	99.70%	99.72%	0.02%
Understood	Online	99.11%	99.37%	0.26%

All levels of scoring have seen a reduction in the level of possible misinterpretation, apart from the '7-10' telephone (CATI) group. The online group has seen significant reductions across all levels. Levels within the misunderstood groups obviously drop as the group becomes larger, but the more interesting groups are towards the higher scores. Across all levels, online has higher levels of misunderstanding in both years, but has also seen the biggest improvement across both modes.

3.2.8.2.4 Conclusions on SWB data quality

Overall, it seems that the quality of subjective well-being data has improved or remained at a high standard. Straight-lining was particularly low given the overall size of the population regardless of the changes and did decrease overall on CATI, although the overall percentage did not increase for online. However, the levels of straight-lining did decrease for the online mode towards the higher scores, which begins to indicate that the aim of decreasing misinterpretation towards the top end of the scale in particular was successful and is a positive step. Additionally, the survey improvements made in year two were not expected to particularly reduce straight-lining, especially for areas where it is valid such as towards the middle or potentially the bottom end of the scale, as low anxiety levels are less likely to correlate to high positivity levels than the other way around¹⁵⁹.

Modal effects seem to have reduced between years for anxiety, which could perhaps be an indication of a reduction in confusion in the online mode but could also be caused by other factors. However, there is a bigger disparity in positively worded questions, which could be influenced by social desirability bias and pandemic effects. Anxiety levels have risen for telephone interviews. This is possibly due to people now seeing it as more socially acceptable to provide higher ratings to the interviewers due to the Covid-19 pandemic; whereas in the past people may have felt more comfortable providing a higher anxiety rating online than through a telephone interview. Research suggests that underreporting of sensitive issues is likely to be lower both when it becomes more socially acceptable and when there is less stigma associated with a topic¹⁶⁰.

Results of the misinterpretation analysis are incredibly positive, as the pandemic may have been expected to have had the opposite impact due to increasing anxiety levels. Overall, the level of apparent misinterpretation has decreased. Across both years, online has higher levels of apparent misinterpretation than telephone interviews, but the online mode has also seen the biggest improvement in understanding. Potential misinterpretation decreased across all levels of scoring apart from for scores of 7-10 in the CATI group. The survey changes were more likely to impact the online mode, which sees significant reductions across all groups. The tables highlight that low happiness, high anxiety responses are much more common in the online mode, which is likely to be a result of social desirability bias, as people may not be as comfortable sharing this sensitive information to a telephone interviewer. There are also fewer graduates across the very high happiness groups, perhaps as a result of the pandemic or other related factors.

3.2.8.3 Location data

Graduates who select that they are engaged in a certain type of employment, and that their place of work is in England, Scotland, Wales or Northern Ireland, are asked to provide the postcode for their place of work. To improve the quality of postcode data, validation was implemented in year two to check the first two digits of the postcode entry and to prevent graduates from entering an

¹⁵⁹ (Arab et al., 2016)

¹⁶⁰ (McNeeley, 2012)

invalid postcode in the free-text field. It is important to ensure that this validation is improving the data, without increasing non-response. After postcode, graduates are asked to provide the city/town of their place of work. If they have selected that they do not know their postcode, or if they provide a short postcode, then city/town is asked as a mandatory question. The quality of this data is therefore linked to postcode, as it is important to know if graduates are dropping out due to this question. Both elements of employment location are analysed in the following section.

3.2.8.3.1 Assessment of postcode validation

Year one data was run through an artificial validation to determine the levels of invalid postcodes that were received. This allows for a more thorough analysis of the data to determine if there have been quality improvements. The following table highlights the postcodes received in Cohort D. It compares year one against year two and combines the postcodes for all employment types. Additionally, the split by completion mode allows a comparison of mode effects, which will be useful in determining if there are mode related quality issues at play. Invalid postcodes from both the short and long groups are compiled into one section/group. The rightmost column gives the percentage difference, colour-coded to indicate positive (green), neutral (yellow) or negative (red) outcomes of the validation changes.

Table 24 Summary of the differences between postcodes collected in Cohort D of year one and year two of the Graduate Outcomes survey, split by completion mode

	Mode	Year 1	Year 2	% Difference
Don't Know	CATI	46.19%	40.55%	-5.64%
Long Postcode	CATI	43.23%	48.90%	5.67%
Not Answered	CATI	0.18%	0.20%	0.01%
Short Postcode	CATI	8.67%	10.34%	1.67%
Invalid postcode	CATI	1.72%	0.02%*	-1.70%
Don't Know	Online	33.24%	32.34%	-0.90%
Long Postcode	Online	61.46%	62.22%	0.76%
Not Answered	Online	0.41%	0.69%	0.28%
Short Postcode	Online	4.78%	4.72%	-0.06%
Invalid postcode	Online	0.12%	0.03%*	-0.08%

*Invalid postcodes in year two are anomalies. These are as a result of either telephone interviewers changing responses after validation or graduates dropping out of the online survey at the time of answering the postcode question and their responses therefore not passing validation. Of these responses, of which numbers are small, many would have passed validation if formatting was corrected.

Differences between the postcode results in year one and two highlight generally positive outcomes as a result of the implementation of postcode validation. There has been an increase in the number of long postcodes provided and a reduction in the number of invalid postcodes, as it was not possible in most circumstances for a graduate to enter an invalid postcode after the implementation of validation. For telephone, this difference is larger and is potentially due to validation reducing interviewers entering incorrect postcodes, either as a result of mishearing graduates or graduates providing an incorrect postcode. There were small numbers of postcodes in both modes that did not pass validation due to either interviewers changing formatting after the validation or graduates not moving forward in the survey after entering their postcode, but these numbers have still reduced significantly. In terms of short postcodes, more were provided in the telephone mode in year two, whereas numbers decreased very slightly for online completions. Both outcomes are marked as neutral in the table, as although it is positive to see an increase in postcode provision overall, these values could be influenced by either more graduates providing a long postcode or more graduates deciding not to answer at all. Indeed, the percentage of graduates who did not answer the postcode question increased slightly in both modes, but this is outweighed by the increases in postcodes provided in total. There has also been a decrease in 'Don't know' responses in both modes, with a significant decrease of more than 5 percentage points for telephone interviews.

3.2.8.3.2 Assessment of town / city question

After the postcode question, graduates are asked to provide the town, city or area of their place of work. This question was simplified in year 3 of the survey to ask about the graduates nearest town or city, but the following assessment is based on the responses received to the question as it was previously worded. If the postcode question is not answered, or a short postcode is provided, then the town/city question becomes mandatory. The table below indicates whether town/ city was filled in and whether it was a mandatory or optional question for the graduate. This helps to give an indication of the overall quality of location data and will help in ensuring that changes to the postcode question have not had a negative impact on other areas of the survey.

Table 25 An indication of the response provided to the town/city question in cohort D of year one and year two, and splits by mandatory or optional, where postcode was answered

		Year 1 Cohort D	Year 2 Cohort D	Difference
Postcode answered	City mandatory and answered	48.12%	46.21%	-1.91%
	City mandatory and NOT answered	0.23%	0.23%	0.00%
	City optional and answered	51.39%	53.19%	1.79%
	City optional and NOT answered	0.26%	0.37%	0.11%

Town/city became optional for more graduates in year 2, again highlighting that more graduates provided a long postcode than the previous year. Positively, most of these graduates still provided a location regardless of the question being optional for them. Of the mandatory group, the percentage of graduates who did not answer remained the same and at a low percentage, highlighting that although the percentage of graduates who answered dropped there was no increase in non-response to the question for mandatory graduates, and this was instead due to an increase in long postcodes being provided.

3.2.8.3.3 Conclusions on location data quality

Overall, the quality of location data has improved. Although there appeared to be a very slight increase in non-response to postcode, the values are very small and the improvements in the quality of data being received is clear, with large increases in long postcodes being provided and a reduction in responses of 'Don't Know'. Equally, there was no increase in the percentage of graduates who did not provide a town/city when it was a mandatory question, highlighting that dropout was not increased at other questions due to validation. City also became optional for more graduates, which is helpful, as postcode data is more efficient to analyse and reduces the risk of bias introduced during processing, compared to the free-text town/city question. It is therefore clear that overall, the quality of the postcode data has seen major improvements since year one, both due to validation improvements and perhaps also as a result of changes in the working patterns of graduates.

3.2.9. PROCESSING ERROR

Processing error includes processing-related errors in data capture, coding, editing and tabulation of the data. This section describes the processes used and the quality assurance apparatus that is employed to avoid bias in processing, and to limit the incidence of variance. We cover the issues that have arisen, and our estimates of their impact.

HESA's processing practices and quality assurance approach are explained in the Survey methodology section on data processing.¹⁶¹ It covers data capture, data quality checking, SIC/SOC data coding (where HESA employs a specialist contractor), free text field 'cleaning', and derived fields.

3.2.9.1. Imputation and editing

No instances of imputation have occurred during the second year of surveying.

In the first year of Graduate Outcomes data processing, HESA applied imputation in one variable that records which country the graduate was studying in on the census week.¹⁶² This variable (STUCOUNTRY) is required to be answered when the previous question, which identifies the university or college the graduate studied at (UCNAME) has an answer that is either not in the pre-defined list of providers, or has not been answered. However, the issue has arisen in the routing where if UCNAME has not been answered, then STUCOUNTRY does not display and cannot be answered. This issued affected respondents meeting the above conditions prior to a fix being applied on 2019-03-22. Of the 2,260 graduates that have missing data, we successfully imputed observations for 625 of them.

Our solution was, where possible, to use imputation to fill the gap of missing data by utilising linked data from the 2018/19 Student record(s) to identify graduates who studied at a UK Higher Education provider whose data is collected by HESA. A process of fuzzy matching was carried out to attempt to link these graduates to the HESA Student and AP records and for the appropriate country code of further study to be picked up (England = XF, Wales = XI, Scotland = XH, Northern Ireland = XG).

¹⁶¹ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/data-processing>

¹⁶² See the field specification at: <https://www.hesa.ac.uk/collection/c17072/a/stucountry>

3.2.9.2. SIC and SOC coding

SIC and SOC codes are applied wherever we have sufficient data to allow this. The data processing section of the Survey methodology explains this further.¹⁶³ An experienced external supplier (Oblong¹⁶⁴) undertakes this coding, and the quality checks they apply are explained in the Survey methodology. Established SIC-coding methodology has proved stable over the long term.¹⁶⁵ A new method had to be developed for SOC coding. Provisional SOC codes were processed using an agreed method by Oblong. These are then supplied to HE providers (through the Portal) which were invited to quality assure the data for themselves. During this phase, more than 90 providers undertook peer review. During the first year of operation this was a semi-structured quality assurance process and relied on the varying resource that providers were able to bring. Although we received feedback from only a sub-set of providers, any changes to SOC coding resulting from this feedback were applied consistently across the entire collection. During the second year of operations, learning from the first year has been applied to streamline and simplify the process, but it remains essentially the same.

All the provider feedback received placed into one of the following four categories: Systemic (where the error is widespread and there is a clear pattern of miscoding); Non-systemic (isolated cases); Inconsistent (where multiple records in an occupation group are coded inconsistently with no obvious pattern) or Not actionable (no basis or evidence exists for coding to be changed).

This helped us identify potential processing issues that affected a large number of records. Non-systemic issues could not be used to improve individual-level data, as this would have been inequitable, and introduce bias through inconsistent application. This exercise has revealed some systemic errors in SOC coding, as well as scrutinising some areas where the coding ultimately met our quality standards. An overview of this process can be found in the data processing section of the operational survey information.¹⁶⁶ Detailed information on the exercise undertaken to review feedback and improve the data processing approach is also available in a detailed briefing, which identifies the impact of the issues identified.¹⁶⁷

As a result of the exercise described above, 8% of records from the first year of surveying had SOC codes changed prior to the production of the outputs. Many users group all codes within SOC major groups 1-3 to identify 'professional and managerial', 'highly skilled', or 'graduate' jobs. Of all the records that changed at the major group level as a result of identified coding problems, 28% moved from major groups 4-9 to 1-3; 13% from major groups 1-3 to 4-9 and the remaining 59% continued to be coded within the same of these two groupings. We also amended the logic to remove the impact of qualification requirements on coding, and to allow many partially-completed responses to also be coded, increasing the usefulness of the data.¹⁶⁸ As a result of this

¹⁶³ See <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/data-processing#data-coding>

¹⁶⁴ Information on our suppliers is here: <https://www.hesa.ac.uk/innovation/outcomes/about/our-suppliers>

¹⁶⁵ HESA has commissioned Oblong as a SIC code supplier in the past, using DLHE data that was similar to the structure of the relevant parts of Graduate Outcomes data. This longstanding methodology continued to prove robust.

¹⁶⁶ See <https://www.hesa.ac.uk/definitions/operational-survey-information#data-classification-sicsoc>

¹⁶⁷ See <https://www.hesa.ac.uk/innovation/outcomes/providers/assessment-1718-soc-coding>

¹⁶⁸ We undertook an investigation to determine whether an improved methodology could yield more complete SOC code data, without reducing consistency. We learned that accurate coding could be achieved for some records that were not previously coded. As a reminder, our previous methodology required four fields (Company Name; SIC code; Job title; Job Duties Description) to be completed by the graduate for SOC to be coded. However, on reflection, where we have found that responses of sufficient quality have been provided in job title and job duties, even where the employer's name and/or duties are missing, we can derive a code, satisfactorily.

comprehensive checking exercise, we believe the sources of systematic processing error identified by HE provider manual quality checks have been removed, and the processing system fixed. There is no evidence that there is any remaining bias in the coding strategy for SOC, and any remaining processing error in year one data is likely to be minimal, and the product of random variation only.

During the second year of operations our engagements with providers over quality assurance was streamlined. On 29 April 2021 we published a report summarizing the year two SOC coding assurance we have undertaken.¹⁶⁹ The summary of SOC coding assurance for the second year of the Graduate Outcomes survey reveals that there were 3048 queries received from HE providers about the SOC codes assigned to graduates' jobs. From these queries systemic issues were found with the coding of 12 occupation groups and a further 30 groups were found to have been coded inconsistently. 95.5% of queries were deemed non-systemic or not actionable.

During the second year of surveying we also conducted research into the reliability of our approach to coding, using established methods for this. In addition to the report on internal quality assurance work, on 29 April 2021 we published a second report detailing this independent verification of the reliability of our approach.¹⁷⁰ An exercise was carried out to compare codes returned by the primary coder for Graduate Outcomes with those returned by an independent organisation to validate HESA's approach to coding and the outputs that follow. Independent coding of occupations by the Office for National Statistics found 'almost perfect' alignment between coders at the major-group level.

Having demonstrated a high standard of reliability in our approach, we intend to refine engagements with HE providers over SOC coding assessment to reduce the burden they experience in supporting quality assurance, and to streamline our production processes.

3.2.9.3. Handling free text responses

Most questions in Graduate Outcomes map directly to established lists of values, and details of these are available in the coding manual.¹⁷¹ However, there is often an "Other" option that permits a free text response. In this subsection and the subsequent ones, we cover the most important issues relating to free text processing, and explain the risks around processing error, giving our estimates for this.

At the end of the collection process, data returned for questions that permit a free-text response goes through a cleansing process, in order to improve data quality. This is usually where the respondent has not chosen a value from the drop-down list provided but has instead selected "other" and typed their own answer. This process also runs for questions seeking postcode, city/area and country of employment, or self-employment / running own business; country in which graduate is living and of further study; provider of further study, and salary currency. Where possible, the free text is mapped to an appropriate value from a dictionary published within the appropriate derived field specification.

¹⁶⁹ See: <https://www.hesa.ac.uk/files/Graduate-Outcomes-SOC-Review-Summary-20210429.pdf>

¹⁷⁰ See: <https://www.hesa.ac.uk/files/Graduate-Outcomes-SOC-coding-Independent-verification-analysis-report-20210429.pdf>

¹⁷¹ The Graduate Outcomes survey results coding manual is available here: <https://www.hesa.ac.uk/collection/c18072>

We have encountered some specific issues in the processing of UK-based location information, which we turn to next. Later subsections offer comparable quality descriptions of cleansing of further study and home country data.

3.2.9.4. Location of work data – handling free text

Location of work is collected from graduates who are in paid work for an employer, voluntary or unpaid work or contracted to start a job in the next month. Respondents in employment are asked to tell us where they worked during the census week.¹⁷² The majority of respondents supplied data that we could process into a structured format, such as their employer's postcode.¹⁷³ In 2018/19, of those graduates in work during the census week, 7% (7% in 2017/18) did not provide any location information and of those graduates contracted to start a job in the next month, 11% (10% in 2017/18) did not provide any location information. These graduates are excluded from the table below.

HESA has developed an algorithm.¹⁷⁴ for the processing field ZEMPCOUNTRY, which cleans up the data provided by a graduate responding to the Graduate Outcomes survey question "In which country is your place of work?". It does this by combining the data provided in EMPCOUNTRY (which is based on a restricted list of values available to the respondent as a drop-down menu) with that from the free text field EMPCOUNTRY_OTHER.

With the enhancement of the derived field mapping process, a large majority of graduates who provided some UK location information could be mapped to county / unitary authority level (derived in XEMPLOCUC). Our matching process is specified in detail within the following processing fields ZEMPAREA and ZBUSAREA and derived fields XEMPLOCUC, XEMPLOCGR, XBUSLOCUC and XBUSLOCGR. Our exact matching process is specified in detail in the two processing fields ZEMPAREA¹⁷⁵ and ZBUSAREA.¹⁷⁶ The previous iteration of the quality report goes into detail about the problems we faced and our course of action for publication of year one data.

¹⁷² This data is gathered through various survey questions (dependent on routing) and stored in the fields: EMPLOC; EMPPCODE; EMPPCODE_UNKNOWN; EMPCOUNTRY; EMPCOUNTRY_OTHER, and; EMPCITY. We also collect parallel data on self-employed graduates, using the fields: BUSEMPLOC; BUSEMPPCODE; BUSEMPPCODE_UNKNOWN; BUSEMPCOUNTRY; BUSEMPCOUNTRY_OTHER, and; BUSEMPCITY. Results for these fields are similar in proportion to those in employment, though the prevalence of self-employment is much lower, and hence we do not offer a detailed analysis on this much smaller group. Detailed metadata on all these fields can be viewed by following links from the data items index in the Graduate Outcomes survey results record coding manual, here:

<https://www.hesa.ac.uk/collection/c18072/index>

¹⁷³ Post-processing, location data can be found in the following derived fields: XMLOCGR; XMLOCN; XMLOCUC; XSTULOCGR; XSTULOCN; XSTULOCUC; XEMPLOCGR; XEMPLOCN; XEMPLOCUC; XBUSLOCGR; XBUSLOCN; XBUSLOCUC, and; XCURRELOC. Details of the processing involved in production is described by following the relevant links available from the derived fields specification contents page in the Graduate Outcomes survey results record coding manual, here:

<https://www.hesa.ac.uk/collection/c18072/derived/contents>

¹⁷⁴ See the specification for ZEMPCOUNTRY:

<https://www.hesa.ac.uk/collection/c18072/derived/zempcountry>

¹⁷⁵ See the derived field specification: <https://www.hesa.ac.uk/collection/c18072/derived/zemparea>

¹⁷⁶ See the derived field specification: <https://www.hesa.ac.uk/collection/c18072/derived/zbusarea>

Table 26 Location of work data - processing free-text responses

	2017/18				2018/19			
	In work	Due to start	Total	%	In work	Due to start	Total	%
Non-UK								
Country selected from drop-down	32705	1405	34110	99.3%	36870	1470	38345	99.5%
Free text country information mapped	50	0	50	0.1%	10	0	10	0.0%
Free text country information not mapped (including NULLs)	185	10	195	0.6%	165	5	170	0.4%
Total in work not in the UK	32940	1415	34355	100.0%	37045	1480	38525	100.0%
UK								
Mapped to county/unitary authority level	235705	6530	242235	96.1%	241215	6570	247785	96.6%
...of whom gave postcode	143945	3105	147050		156330	3335	159665	
Mapped to GOR level but not county/UA level	1055	30	1085	0.4%	725	30	760	0.3%
Mapped to country level (based on EMPLOC)	8545	330	8875	3.5%	7725	270	8000	3.1%
...of whom refused to give information (approximately)	1110	50	1160		1335	50	1385	
...of whom gave NULL response	1155	40	1195		1285	35	1320	
Total in work in the UK	245305	6890	252195	100.0%	249670	6875	256545	100.0%

Location of self-employment or own business is collected from graduates who are in self-employment or running their own business during the census week. In 2018/19, of those graduates in self-employment or running their own business during the census week, 9% (10% in 2017/18) did not provide any location information. These graduates are excluded from the table below. With the enhancement of the derived field mapping process¹⁷⁷, a large majority of graduates who provided some UK location information could be mapped to county / unitary authority level (derived in XBUSLOCUC).¹⁷⁸

¹⁷⁷ See derived field specification for ZBUSCOUNTRY at:

<https://www.hesa.ac.uk/collection/c18072/derived/zbuscountry>

¹⁷⁸ See derived field specifications XBUSLOCGR and XBUSLOCUC (navigating from

<https://www.hesa.ac.uk/collection/c18072/derived/contents>)

Table 2727 Location of self-employment or own business - processing free-text responses

	2017/18		2018/19	
	Total	%	Total	%
Non-UK				
Country selected from drop-down	7165	99.0%	8445	99.5%
Free text country information mapped	5	0.1%	5	0.0%
Free text country information not mapped (inc. NULLs)	70	1.0%	40	0.5%
Total in self-employment/own business not in the UK	7240	100.0%	8490	100.0%
UK				
Mapped to county/unitary authority level	27145	94.8%	29085	95.3%
...of whom gave postcode	15625		18320	
Mapped to GOR level but not county/UA level	160	0.6%	115	0.4%
Mapped to country level (based on EMPLOC)	1330	4.6%	1305	4.3%
...of whom refused to give information (approximately)	240		315	
...of whom gave NULL response	150		165	
Total in self-employment/own business in the UK	28635	100.0%	30510	100.0%

As a result, the year two data has been released at a more granular geographic resolution. We have also reprocessed year one data to also reach a higher resolution. Users of microdata will also notice improvements in geographical resolution and should assess data quality for uses below regional level. Improving geographical resolution further remains a priority for HESA, as we are aware of strong user demand for high-resolution place-based analysis.

We continue to view improvements to geographical resolution as a priority and are currently undertaking a programme of work to evaluate the pros and cons of various options for this, including improvements to the survey instruments and also to the algorithmic approach we utilise in data processing.

3.2.9.5. Further study data – handling free text

Further study data on the provider attended¹⁷⁹ reflects the very large number of HE providers that UK graduates go on to study at. Provider information is collected from graduates undertaking further study during the census week or those who are due to start studying in the next month. Graduates can either select their UK provider from a drop-down menu or can provide details in a free text box. Where a student selects their UK provider from the drop-down menu, they are assumed to be studying in the UK, otherwise they are asked for their country of provider. Graduates provide country of further study information by selecting from the country drop-down menu or entering in the free text box.

Of those 2018/19 graduates who were in further study in the census week, 17% (20% in 2017/18) did not provide any information about their provider and of those due to start study, 22% (28% in 2017/18) did not provide any information about their provider. Of the 2018/19 graduates in further study in the census week who did not select their provider from the drop-down menu, 5% (10% in 2017/18) did not provide any country information and of those due to start study, 10% (17% in 2017/18) did not provide any country information.

¹⁷⁹ See the specification for free text 'other' responses at https://www.hesa.ac.uk/collection/c18072/a/ucname_other. This is returned where a respondent does not locate suitable option from the list of values at: <https://www.hesa.ac.uk/collection/c18072/a/ucname>

The first table below excludes these graduates who did not supply any provider information and the second excludes those who did not supply any country information and did not select their provider from the drop-down menu. Most graduates use the drop-down menus to supply provider and country information, only a small proportion use the free text box.

Table 28 Provider - processing free text responses

	2017/18				2018/19			
	In study	Due to start	Total	%	In study	Due to start	Total	%
Provider selected from drop-down menu	47525	13720	61245	80.1%	52920	14980	67900	77.9%
Free text provider information mapped (studying in the UK)	395	105	500	0.7%	590	130	720	0.8%
Free text provider information not mapped (studying in the UK)	7245	2075	9320	12.2%	9900	2200	12100	13.9%
Not studying in the UK	4560	800	5355	7.0%	5555	880	6435	7.4%
Total	59725	16700	76425	100.0%	68965	18190	87155	100.0%

Table 29 Provider country - processing free text responses

	2017/18				2018/19			
	In study	Due to start	Total	%	In study	Due to start	Total	%
Provider selected from drop-down	47525	13720	61245	71.3%	52920	14980	67900	68.2%
Country selected from drop-down	19080	5430	24510	28.5%	25615	5975	31590	31.7%
Free text country information mapped	30	15	50	0.1%	15	20	35	0.0%
Free text country information not mapped	65	30	100	0.1%	35	15	50	0.1%
Total	66700	19200	85905	100.0%	78590	20990	99580	100.0%

3.2.9.6 Home country – handling free text

Home country information is collected from graduates who are doing something other than being in some form of employment or further study during the census week.¹⁸⁰ Graduates can either select their home country from a drop-down menu or can provide details in a free text box. In both 2018/19 and 2017/18, 2% of graduates did not provide any home country information. The tables below exclude those graduates who did not provide any home country information.

Table 30 Home country - processing free text responses

	2017/18		2018/19	
	Total	%	Total	%
Country selected from drop-down	35035	99.9%	42160	100.0%
Free text country information mapped	20	0.1%	0	0.0%
Free text country information not mapped	20	0.1%	5	0.0%
Total (excluding Null)	35070	100.0%	42165	100.0%

¹⁸⁰ See derived field specification at <https://www.hesa.ac.uk/collection/c18072/derived/ZHOMECOUNTRY>

3.3. TIMELINESS AND PUNCTUALITY

In this section, we assess the timeliness and punctuality of the collection, analysis, and publication of Graduate Outcomes data.

Timeliness here refers to the gap between the publication of data and the period to which the data refer. Timeliness of data is an important aspect of meeting user needs; where data is going to be used to guide decisions on the part of users, it is important both that users have access to the most current data and that the gap between collection and publication is reduced as much as is compatible with the production of high quality statistical outputs.

Punctuality refers to the publication of statistical outputs according to a pre-announced timetable. In the interests of transparency and fair access to data, it is a requirement of the Code of Practice for Statistics that official statistics outputs should be pre-announced as part of a 12-month release calendar, and that any deviations from planned publication dates should be announced and explained as soon as possible.¹⁸¹

3.3.1. TIMELINESS AND USER NEEDS

As discussed in section 3.1.1 above, HESA data on graduates is of interest to a wide variety of users. For many users, HESA data provides important support for decision making processes; prospective students may use information about what graduates do after completing their qualifications to inform their choices of course and provider, while graduate employers may target their efforts on the basis of outcomes data. For all these users, the ability to make good decisions will depend in part on access to timely data; given the rapidly evolving nature of the graduate labour market, for example, policies which aim to attract graduates with certain skills to a city or region will be less effective if it is based on out-of-date information about where graduates are more likely to do certain kinds of jobs.

The timescale for collecting and publishing Graduate Outcomes data was considered carefully in the design of the new survey. The DLHE survey collected information about graduates six months after the completion of their qualification, and a stratified sample of DLHE respondents were surveyed again three years later for the LDLHE (Longitudinal Destinations of Leavers from Higher Education) survey. The majority of stakeholders who took part in the first NewDLHE consultation believed that the new survey should be carried out at some point between six and thirty-six months after the completion of qualifications. Six months was seen as too early, inasmuch as graduates would not yet have had time to make much progress in their post-HE careers; on the other hand, there was seen to be a risk that it would be difficult to contact enough graduates to provide a suitable dataset thirty-six months after graduation.¹⁸² The 15-month interval between graduation and data collection used in the Graduate Outcomes survey was therefore selected so as to strike a balance between the availability of more useful careers data and the ability to obtain a high response rate.

Once all four cohorts for any given year have been surveyed, HESA aims to move swiftly towards publication, delivering final provider-level data to back to the providers it concerns about three months after the close of the data collection for the final cohort and releasing the Statistical Bulletin

¹⁸¹ Code of Practice for Statistics, Sections T3.1 and T3.2. <https://code.statisticsauthority.gov.uk/wp-content/uploads/2018/02/Code-of-Practice-for-Statistics.pdf>

¹⁸² HESA. 2016. 'Synthesis of Consultation Responses.' https://www.hesa.ac.uk/files/NewDLHE_consultation-synthesis.pdf

and open data about two months later. This timeline ensures that users of the survey have access to data on what graduates are doing 15 months after graduation while that data is still current.

3.3.2. PRODUCTION TIMELINE

In accordance with the Code of Practice for Statistics, HESA announces its planned data releases in advance. Upcoming data releases are announced on the HESA website, with their month of publication, at least six months before the planned publication date; National Statistics data releases are also pre-announced on the National Statistics hub.¹⁸³ Exact dates for publication are confirmed at least four weeks before each data release.

The first release of Graduate Outcomes data was initially scheduled to take place in spring 2020; In the autumn of 2019, it was announced that both the Statistical Bulletin and the open data release would take place in April 2020. Before a precise publication date could be released, however, HESA staff moved to home-based working in response to the Covid-19 pandemic. As a result both of the challenges of remote working and of capacity issues caused by the pandemic, the publication of the Statistical Bulletin was delayed until 18 June 2020, with the open data released subsequently in two tranches.¹⁸⁴ Although it was not possible to adhere to the timeline published before the pandemic, HESA followed the guidance issued by the UK Statistics Authority on the production of statistics during the coronavirus crisis and announced any changes to the publication timeline as far as possible in advance.¹⁸⁵

The second year of Graduate Outcomes data was originally scheduled to be published in May 2021. Additional preparatory work, however, was required for the second year of publications, including investigations into the effects of the Covid-19 pandemic on 2018/19 data and whether it would be necessary to apply weighting to the results of the survey.¹⁸⁶ Taking into account the time that would be required for these additional investigations, coupled with the ongoing challenges of publishing under pandemic circumstances, we made the decision to delay publication of the 2018/19 data until July 2021, with the Statistical Bulletin scheduled to be released on 20 July 2021, followed by the open data tables shortly afterward.

3.3.3. FREQUENCY OF PRODUCTION

From its inception, the Graduate Outcomes survey was designed to be published, like DLHE, as an annual data release. The Higher Education and Research Act 2017 specifies that data relating to HE providers in England and their courses must be published at least once a year, and an annual timetable reflects the fact that most UK higher education activities are organised around the academic year, which runs from early autumn to early summer.¹⁸⁷

¹⁸³ HESA. *Upcoming data releases*. <https://www.hesa.ac.uk/data-and-analysis/upcoming>
For upcoming National Statistics releases, see also https://www.gov.uk/search/research-and-statistics?content_store_document_type=upcoming_statistics

¹⁸⁴ HESA. 2020. *Coronavirus update*. <https://www.hesa.ac.uk/news/coronavirus>
For the final publication timetable for Graduate Outcomes, see <https://www.hesa.ac.uk/data-and-analysis/upcoming>

¹⁸⁵ Office for Statistics Regulation. 2020. *Regulatory guidance: Guidance on statistical practice for statistics producers during the coronavirus crisis*. UK Statistics Authority. <https://osr.statisticsauthority.gov.uk/wp-content/uploads/2020/07/Regulatory-guidance-changing-methods-Coronavirus.pdf>

¹⁸⁶ HESA. 2021. Graduate Outcomes 2018/19 data delivery. <https://www.hesa.ac.uk/news/29-03-2021/graduate-outcomes-201819-data-delivery>

¹⁸⁷ Higher Education and Research Act 2017, section 65.

Not all graduates, however, complete their qualification at the same point in the academic year, and collecting data in quarterly cohorts allows us to make sure that we obtain data from all graduates about their activities 15 months after completion, regardless of when they completed their qualification. If all graduates finishing their degrees in the 2018/19 academic year (August 2018 to July 2019) had been surveyed with reference to a single census week in September 2020, for example, we would have data from twenty five months after completion for those students who had completed their qualifications in August 2018, but only fourteen months after completion for those who had finished in July 2019; such a discrepancy in timescale would make it difficult to compare outcomes for graduates finishing their qualifications at different points in the academic year.

The first two years of publication have been shaped by the Covid-19 pandemic and the resulting changes in our ways of working at HESA. From year three of Graduate Outcomes, it is hoped that HESA will be able to move gradually towards the collection and publication timetable initially established for year one, with data collection for cohort D closing at the end of November and statistical releases being published annually in the late spring or early summer.

3.4. ACCESSIBILITY AND CLARITY

In this section, we discuss issues of accessibility and clarity relating to the Graduate Outcomes dataset and the statistical outputs which are based upon it. In assessing statistical quality, accessibility refers to the ease with which users are able to obtain the data, including the format or formats in which the data is available and any supporting information which may be needed. Clarity refers to the availability and comprehensibility of any metadata which its users may need to understand the statistical data fully.

3.4.1. CONFIDENTIALITY AND DISCLOSURE CONTROL

Given that the Graduate Outcomes survey requires the collection of contact details and other personal information about respondents, issues of data protection, confidentiality, and disclosure control have been important throughout the design and implementation phases of the survey.

HESA receives contact details for most graduates from providers.¹⁸⁸ Students are informed that their contact details will be passed on to HESA via HESA's Student Collection Notice, which informs students that, after graduation, providers will pass graduate contact details on to HESA and any organisations contracted by HESA to enable the collection of Graduate Outcomes data. The Student Collection Notice further informs students of the legal basis for the processing of their contact details for use in Graduate Outcomes, stating that contact details obtained from providers will be processed by HESA on the grounds that such processing is necessary for the performance of a task carried out in the public interest and for research and statistical purposes.¹⁸⁹

Data protection policies and privacy notices available both on the HESA website and on the separate Graduate Outcomes website inform both providers and respondents of the uses which will be made of graduate data. Providers and respondents are informed that graduates may opt out of completing the survey, but that responses to the survey will be processed in accordance with GDPR on the basis of public interest, not consent.¹⁹⁰ Respondents are informed that their survey responses will be passed on to their HE provider, but that, unless they explicitly agree to be contacted by their provider about their survey responses, providers will only use survey responses for statistical and research purposes; while providers receive SWB data, they do not receive SWB responses for individual graduates, but instead receive aggregated statistical information about all their graduates' responses. Similarly, while Graduate Outcomes responses are passed on to a variety of other public and private bodies (including HE funding and regulatory bodies, public authorities, and others who have a legitimate interest in using the data for research and statistical purposes), survey responses are not used to make decisions about individuals. Where Graduate Outcomes data is passed on to third parties for use in research about higher education and the

¹⁸⁸ As discussed in section

3.1.2. Data and statistical concepts, above, contact details for graduates of English further education colleges can be supplied to HESA by the OfS.

¹⁸⁹ HESA. 2020. *Student Collection Notice*. Available at: <https://www.hesa.ac.uk/about/regulation/data-protection/notices>

The legal basis for processing contact details for the collection of Graduate Outcomes data refers to GDPR Articles 6(1)(e) and 89.

¹⁹⁰ Information for providers: HESA. *Data protection guidance: Lawfulness of processing*.

<https://www.hesa.ac.uk/innovation/outcomes/providers/data-protection>

Information for graduates: HESA. *Graduate Outcomes: Privacy Information*.

<https://www.graduateoutcomes.ac.uk/privacy-info>

student population, the data is supplied under contracts which ensure that individuals cannot be identified from the data.¹⁹¹

When Graduate Outcomes data – or any other HESA data about people – is used in statistics published by HESA or any other users of HESA data, the data is subject to HESA’s rounding and suppression strategy, which aims to reduce the risk of identifying individuals from published statistics. There are three main aspects to HESA’s rounding strategy, each of which contributes to the protection of individual data: first, all counts of people are rounded to the nearest multiple of five; second, percentages based on fewer than 22.5 people are suppressed, and, third, averages are not published if they are based on seven or fewer individuals. Rounding counts of people prevents the use of multiple tables to identify small numbers of individuals, while the suppression of percentages based on fewer than 22.5 individuals and averages based on fewer than seven individuals prevents users from working back from an average or a percentage in order to obtain individual data.¹⁹²

HESA’s rounding strategy is designed to protect personal data, while still enabling HESA and other users of HESA data concerning individuals to publish useful statistics. In this vein, to prevent the compounding of inaccuracy which would occur if calculations were based on rounded figures, the rounding strategy is applied to the data only after any calculations have been carried out. Likewise, the specific thresholds applied in the rounding strategy represent an attempt to strike a balance between disclosure control and the production of detailed statistics; while rounding to multiples of 50, for example, would make it even harder to identify individuals, such a strategy would reduce the usefulness of the statistics which could be published.

3.4.2. STATISTICAL PRODUCTS AND SUPPORTING INFORMATION

As has been discussed in sections 3.3.2 and 3.3.3 above, data for the second year of the Graduate Outcomes survey will be published in July 2021, with subsequent data releases occurring annually in late spring or early summer. Like other HESA statistical releases, Graduate Outcomes data is not subject to scheduled revision; revisions to statistical releases are only carried out in the event of errors in HESA’s data collection and production processes.¹⁹³

HESA produces two main statistical outputs based on the Graduate Outcomes data. The first is a Statistical Bulletin, which contains a range of tables, charts, and summary analysis of headline figures drawn from the data; the second is the release of open data, published about a week after the Statistical Bulletin, containing a wider range of tables and charts, including provider-level for some variables. Both the Statistical Bulletin and the Open Data are available for free on the HESA website, and each chart is accompanied by a freely available data download, allowing users to conduct their own analysis of the data.¹⁹⁴

In addition to the Statistical Bulletin and the open data, HESA has also published a variety of outputs, including this quality report, designed to help users understand the Graduate Outcomes survey and the statistical outputs derived from it. In March 2020, HESA published a Survey

¹⁹¹ HESA. *Graduate Outcomes: Privacy Information*. <https://www.graduateoutcomes.ac.uk/privacy-info>

¹⁹² The full rounding methodology and rationale for the rounding strategy is available on the HESA website: <https://www.hesa.ac.uk/about/regulation/data-protection/rounding-and-suppression-anonymise-statistics>

¹⁹³ HESA. *Revisions policy*. <https://www.hesa.ac.uk/about/regulation/official-statistics/revisions>

¹⁹⁴ Further detail about the format and contents of the Statistical Bulletin and the open data release can be found in the dissemination section of the Graduate Outcomes methodology: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/dissemination>

methodology concerning the Graduate Outcomes survey, along with an accompanying blog post explaining the main points covered in each part.¹⁹⁵ The Survey methodology outlines the predecessors to the Graduate Outcomes survey, DLHE and LDLHE, the need for a new survey, and the process by which the new survey was developed. It then goes on to discuss in detail the most important aspects of the design and implementation of the survey, with sections on survey coverage, survey design, data collection, data processing and analysis, data dissemination, sector engagement, and the evaluation of the survey.¹⁹⁶ The Survey methodology has been updated to reflect changes which have taken place since the initial publication; the revised version of the Survey methodology will be released alongside the 2018/19 data. In May 2020, HESA published a dissemination policy for the Graduate Outcomes survey, setting out HESA's policy, approaches, and standards for the dissemination of Graduate Outcomes data; for 2021 an updated version of this document has been integrated into the Survey methodology, and will be published along with the year two data. The dissemination section of the Survey methodology (which applies both to HESA's publications and to those which may be produced by other users) includes sections on key users and uses of the data, legal and ethical considerations, and HESA's policy on misrepresentation of data; it also contains sections on HESA's statistical outputs based on the survey and supporting information for users of the data¹⁹⁷. Supplementary information on our approach to data concepts and standards can be found in the following section of this report on coherence and comparability.

HESA also makes a range of other metadata available to users of the survey. The Graduate Outcomes section of the HESA website includes general information about the project and the survey, a link to the information page for students and graduates, a link to the information page for providers, and links to the Graduate Outcomes coding manuals; the survey results coding manual contains a variety of detailed metadata, including information on survey coverage, survey routing, and the variables used in the dataset.¹⁹⁸ The information page for providers includes a variety of resources, including detailed operational survey information; the operational survey information page includes detail on how the survey is being carried out, as well answers to FAQs about survey operation, response rates, and the delivery of data to providers.¹⁹⁹ In April 2021, HESA published a summary of the work done to quality assure the SOC coding of year two data; alongside that summary report, HESA also published a separate report on the results of an independent verification exercise in which SOC codes returned by the primary coder for Graduate Outcomes were compared with those returned by the Office for National Statistics.²⁰⁰

Further information about HESA's data can also be found on the 'Definitions and data standards' page of the HESA website. This page includes a glossary which defines terms and acronyms frequently used in HESA outputs; information about the coding of subjects, disciplines, industries, and occupations; data intelligence notes which describe specific issues in the HESA data; and lists

¹⁹⁵ Blog post: 'The ultimate guide to Graduate Outcomes.' <https://www.hesa.ac.uk/blog/16-04-2020/ultimate-guide-graduate-outcomes-hesa-publishes-survey-methodology-statement>

¹⁹⁶ Graduate Outcomes Survey methodology: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology>

¹⁹⁷ See: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/dissemination>

¹⁹⁸ The main HESA Graduate Outcomes site: <https://www.hesa.ac.uk/innovation/outcomes>;
Graduate Outcomes survey results coding manual: <https://www.hesa.ac.uk/collection/c18072>
Index of data items: <https://www.hesa.ac.uk/collection/c18072/index>

¹⁹⁹ HESA. 2020. *Operational survey information*. <https://www.hesa.ac.uk/definitions/operational-survey-information>

²⁰⁰ A summary and links to both reports can be found here: <https://www.hesa.ac.uk/news/29-04-2021/occupational-coding-accuracy-graduate-outcomes>

of definitions relevant to each HESA data stream.²⁰¹ The 'Definitions and data standards' page also includes answers to a number of FAQs which are relevant to multiple HESA collections, including a specific page covering Graduate Outcomes.

To help users navigate the range of supporting materials available, HESA has developed a single [user guide](#) bringing together all the materials described above, as well as this quality report. For the second year of Graduate Outcomes publication, this user guide has taken the form of a detailed table of contents, which will inform users about the various resources available to them and what is contained in each of those resources. In subsequent years, we aim to act on user feedback on the presentation of supporting documentation, and we will adapt the user guide as necessary to meet user needs.

3.4.3. ACCESS AND USE

The Graduate Outcomes Statistical Bulletin and open data are freely available and downloadable on the HESA website under a Creative Commons Attribution 4.0 (CC BY 4.0) license.²⁰² Users of the data are free to copy, use, share, or adapt it for any purpose, provided that they give appropriate credit to HESA, provide a link to the Creative Commons license, and indicate if any changes have been made to the data.²⁰³

Since Graduate Outcomes data is freely available for public use, HESA cannot be responsible for the uses made of its data by external parties; HESA neither has the resources to police external uses of its data nor desires to be an arbiter of truth in the domains in which it publishes data. At the same time, HESA is aware that use of its data to support invalid conclusions or interpretations could entail a risk to the perceived trustworthiness, quality, and value of HESA's statistical outputs. With this risk in mind, the dissemination section of the Graduate Outcomes methodology includes HESA's policy on potential misrepresentations of the Graduate Outcomes data, outlining the steps which HESA may take if a factual misrepresentation is perceived to have taken place.²⁰⁴

In addition to the Graduate Outcomes data which is available on the HESA website as open data, other datasets relating to the Graduate Outcomes survey are available to certain categories of users. HESA's statutory customers receive quality-assured microdata covering HE providers in their constituencies and a range of data fields aligned with their statutory powers and public functions; individual providers also receive microdata for their own graduates on an individual basis, except for the SWB data, which is released to providers only in aggregated form.

Tailored datasets are also available for users who have data needs which are not met by the Graduate Outcomes open data. These datasets are available for a fee and can be commissioned

²⁰¹ HESA. General Definitions and data standards are here: <https://www.hesa.ac.uk/support/definitions>
The list of definitions relevant specifically to the Graduate Outcomes survey can be found here: <https://www.hesa.ac.uk/support/definitions/graduates>

²⁰² Creative Commons. <https://creativecommons.org/licenses/by/4.0/>

²⁰³ HESA. *Open data and official statistics*. <https://www.hesa.ac.uk/data-and-analysis>

²⁰⁴ For more detail on HESA's policy concerning misrepresentation of the Graduate Outcomes data, see the dissemination section of the Graduate Outcomes Survey methodology: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/dissemination>

through Jisc, HESA's data analytics partner.²⁰⁵ Graduate Outcomes data will be available for use in tailored datasets as soon as possible after the release of the open data.²⁰⁶

Further information about Graduate Outcomes data and publications is available from HESA's Official Statistics team (official.statistics@hesa.ac.uk or (0)1242 388 513 [option 2]).

²⁰⁵ For further information on tailored datasets, see the Jisc website: <https://www.jisc.ac.uk/tailored-datasets>

²⁰⁶ Graduate Outcomes Survey methodology (dissemination section): <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/dissemination>

3.5. COHERENCE AND COMPARABILITY

In this section, we discuss the coherence and comparability of the Graduate Outcomes data. Coherence here refers to the degree to which the Graduate Outcomes survey uses the same processes and harmonised methods which are used in other investigations of the same or similar domains; under the category of coherence we will be discussing both the uses of and deviations from national and international standard definitions in the Graduate Outcomes data and the relationship between Graduate Outcomes data and other datasets which may be available on the post-university careers of graduates. Comparability refers to the degree to which data can be compared over time; under this heading, we will be discussing the relationship of Graduate Outcomes with the DLHE survey, and the impact of the Covid-19 pandemic on the second year of Graduate Outcomes.

3.5.1. NATIONAL AND INTERNATIONAL DATA STANDARDS

Several of the domains covered in the Graduate Outcomes survey are domains to which established data standards apply. Work and employment, occupation, industry, and subjective wellbeing have all been the subject of considerable previous study, and, as a result of that study, standardised conceptual frameworks and definitions have been developed to facilitate their discussion and analysis. Where possible, HESA aims to conform to these accepted data standards to enable comparisons between HESA data and other datasets and analyses relating to the same concepts, but it is important to discuss any areas in which we adapt internationally recognised standards to suit our analytical needs.

Where Graduate Outcomes data refers to work or employment, HESA aims to conform to standard definitions wherever practical. The UK Office for National Statistics (ONS) has developed a standard framework, based on the concepts of labour supply and demand, for labour market statistics, which includes definitions for important concepts such as employment. This approach to labour market statistics is broadly compatible with the approaches taken by other international bodies, and the ONS definitions of key terms align closely with those used by the International Labour Organization (ILO).²⁰⁷

HESA for the most part follows the definitions of work and employment used by the ONS and the ILO. The ILO defines work as ‘an activity performed by persons of any age and sex to produce goods or to provide services for use by others or for own use’, while employment is a sub-category of work referring to those who are ‘engaged in any activity to produce goods or provide services for pay or profit’.²⁰⁸ Thus graduates who identify their most important activity as being engaged in unpaid or voluntary work for an employer are classified by HESA as in work, but not in employment. Although caring for someone else meets the ILO definition of work, however, graduates whose main activity is caring for someone else on an unpaid basis are classified as neither in work nor employment, and are included for analysis in the group of graduates undertaking ‘any other activity’. With this discrepancy in mind, we are continuing to review how best to align our data with ILO definitions of work and employment.

²⁰⁷ Office for National Statistics. 2020. ‘Introduction’, in *A guide to labour market statistics*.

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/aguidetolabourmarketstatistics#introduction>

²⁰⁸ International Conference of Labour Statisticians. 2013. *Resolution I: Resolution concerning statistics of work, employment and labour underutilization*. ILO Department of Statistics (ILOSTAT).

http://www.ilo.ch/wcmsp5/groups/public/---dgreports/---stat/documents/normativeinstrument/wcms_230304.pdf

On the basis of Graduate Outcomes data, it is possible to identify those graduates who fit the ILO definitions of work or employment.²⁰⁹ Identifying those who are unemployed according to the ILO definition, however, is less straightforward. The ILO defines ‘persons in unemployment’ as ‘those of working age who were not in employment, carried out activities to seek employment during a specified recent period and were currently available to take up employment given a job opportunity’; the ONS further specifies that, in order to be classified as in unemployment, people must be available to start a job within the next two weeks.²¹⁰ While the list of possible activities offered to respondents includes ‘unemployed and looking for work’, graduates who select this option are not asked how soon they would be able to take up work, and it is therefore not possible to identify them as unemployed according to national or international standards. Users wishing to compare the percentage of graduates who are not in work or further study with the unemployment rate in the wider population – a figure derived using the ONS definition of unemployment – should therefore use caution, since the relevant concepts are not directly comparable.

Graduates who are engaged in work for an employer (whether paid or unpaid), self-employment, running their own business, or developing a portfolio, are assigned both a Standard Industrial Classification (SIC) code and a Standard Occupational Classification (SOC) code. SIC codes for Graduate Outcomes are assigned using the SIC 2007 framework, which is the current industrial classification system maintained by the ONS; SIC 2007 is based on NACE (originally an acronym for *Nomenclature générale des activités économiques dans les Communautés européennes*), the European Community classification of economic activities, but with the addition of a fifth digit where it has been found necessary.²¹¹ While SOC, like SIC, is a UK-based classification system administered by the ONS, the two most recent versions of SOC have both been broadly aligned with the International Standard Classification of Occupations 2008 (ISCO-08) so as to allow for comparison between UK and international employment roles.²¹²

SOC codes for the first year of Graduate Outcomes were initially assigned using SOC 2010 (DLHE), a fifth-digit expansion of the four-digit ONS SOC 2010 framework. SOC 2010 (DLHE) was developed for use with the DLHE survey in order to provide more detail about certain jobs often favoured by graduates, particularly those in areas where graduates were closely associated with a

²⁰⁹ While graduates who report that their main activity is caring for someone else on an unpaid basis are not included in HESA’s tables of graduates in work, those graduates can still be identified as belonging to a category which fits under the ILO definition of work.

²¹⁰ Definitions of unemployment are available on the ILO ‘Concepts and definitions’ webpage (<https://ilostat ilo.org/resources/concepts-and-definitions/>) as well as the ONS publication, *A guide to labour market statistics* (<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/aguidetolabourmarketstatistics#unemployment>)

²¹¹ Office for National Statistics. 2009. *UK Standard Industrial Classification of Economic Activities 2007 (SIC 2007): Structure and explanatory notes*. <https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007>

²¹² Office for National Statistics. *Classifying the Standard Occupational Classification 2020 (SOC 2020) to the International Standard Classification of Occupations (ISCO-08)*. <https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassification/soc2020/classifyingthestandardoccupationalclassification2020soc2020totheinternationalstandardclassificationofoccupationsisco08>

proliferation of new roles in rapidly-developing parts of the economy.²¹³ Although SOC 2010 (DLHE) is a bespoke framework, the first four digits of any SOC 2010 (DLHE) code map directly onto the appropriate four-digit SOC 2010 unit group, which enables comparisons with SOC data from other national datasets.

A new UK SOC coding framework, SOC 2020, was published in February 2020, shortly prior to publication of the year one data. After analyzing the SOC 2020 coding frame and determining that it would be suitable for use in our processing, we decided to adopt the new framework for use in Graduate Outcomes from year two of the survey. Results of the survey of 2018/19 graduates have been therefore published using the latest 2020 version of SOC. In parallel with the coding of year two data, year one SOC data was recoded to SOC 2020 to enable time series comparisons between year one and subsequent years of the Graduate Outcomes survey.

The use of nationally and internationally recognised standards to classify the industries and occupations in which graduates work enables comparison between HESA data on graduates in the workforce and other studies of employment which include data on industry and occupation. The move to SOC 2020 from year two of Graduate Outcomes and the concurrent recoding of year one SOC data further facilitates such comparisons by ensuring that graduates are classified according to the system which most closely reflects the current state of the labour market. The training requirements for occupations can change over time, and occupations may therefore move between SOC major groups when the SOC framework is revised; thus some occupations, including higher level teaching assistants and veterinary nurses, have moved from major group 6 ('Caring, leisure and other service occupations') in SOC 2010 to major group 3 ('Associate professional occupations') in SOC 2020.

HESA published the recoded year one SOC data in an ad hoc statistical bulletin on 20 May 2021.²¹⁴ The recoded data revealed a small increase in the proportion of graduates in occupations classified as 'high skilled'. Under the old classification, 75.9% of graduates working in the UK were in highly skilled occupations, compared with 76.4% under SOC 2020. In particular, over 2,000 survey respondents were in occupations such as those described above which the new coding framework places in the high skilled category as 'Associate professional occupations' (major group 3), which were previously placed by SOC 2010 in the medium skilled category as 'Caring, leisure and other service occupations' (major group 6). The proportion of graduates in occupations classified as low skilled remained the same after the coding change at 9.9%.

Nationally accepted data standards are also relevant to the Graduate Outcomes SWB data. Graduate Outcomes measures SWB using a set of four questions (the ONS4) which were originally designed for the ONS as a harmonised standard of personal wellbeing; the ONS4 were first added by the ONS to the 2011 Annual Population Survey, and they have since been included in a range of other social surveys, including the Labour Force Survey (LFS).²¹⁵ HESA follows the

²¹³ Elias, P. and R. Ellison. 2012. 'Standard Occupational Classification (2010) for the Destinations of Leavers from Higher Education: SOC 2010 (DLHE)'.

<https://www.hesa.ac.uk/collection/c14018/download/soc2010dlhe.pdf>

²¹⁴ HESA's ad-hoc statistical bulletin *Graduate Outcomes SOC 2020 update: UK, 2017/18* includes updated versions of relevant occupation tables previously published using the SOC 2010 classification, as well as comparisons of the results under the old and new SOC classifications. See:

<https://www.hesa.ac.uk/news/20-05-2021/graduate-outcomes-soc-2020-update>

²¹⁵ Office for National Statistics. *Personal well-being user guidance*.

<https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/methodologies/personalwellbeingsurveyuserguide>

ONS guidance on use of the SWB questions; the four questions are used verbatim in the Graduate Outcomes survey, and respondents are asked to give their answers to each question on a scale of 0 to 10, as specified by the ONS. HESA has also adopted the ONS' bracketing methodology in outputs based on the SWB data. The adoption of a widely used set of SWB measures in Graduate Outcomes enables comparisons between graduate wellbeing data and wellbeing data collected in other social surveys; although it will be important to take potentially confounding factors into account in any analysis, the SWB measures themselves will be comparable.

3.5.2. GRADUATE OUTCOMES AND OTHER DATA ON GRADUATES

While Graduate Outcomes is the only national survey designed specifically to provide insight into the experiences of higher education graduates, the domains of several other datasets overlap to an extent with the domain of the Graduate Outcomes survey. Graduates in further study at UK higher education providers will be recorded in the HESA Student Record, and linking the two datasets can provide further information about the quality of Graduate Outcomes data. Beyond HESA, both the Longitudinal Educational Outcomes (LEO) study and the Labour Force Survey (LFS) collect data on education and salary, with the LFS also including detailed information on employment and occupation. While the Graduate Outcomes, LEO, and the LFS can provide complementary views of graduates in the workforce, it is important to understand key differences between the three data sources.

3.5.2.1. Graduate Outcomes and the HESA Student record

In Spring 2021, HESA analysts carried out a quality assurance investigation based on linked data from the HESA Student record and the 2017/18 Graduate Outcomes dataset. A linked dataset was constructed linking all graduates in the 2017/18 target population with the Student records from 2017/18 to 2019/20, and fuzzy matching of data items contained in both Student and Graduate Outcomes was used to identify those members of the Graduate Outcomes population who appeared to be in further study according to the Student record during the relevant Graduate Outcomes census week. By investigating the characteristics of graduates who appeared to be in further study in both datasets, those who recorded themselves in Graduate Outcomes as engaged in a course of further study or training but could not be found in the Student record, and those who appeared to be in further study in the Student record but not in the Graduate Outcomes dataset, we hoped to evaluate the extent to which data on further study in the two datasets is consistent and comparable.

For those graduates who could be found in further study in both datasets, we examined the quality of the matches between the two datasets and identified the most frequent areas of mismatch. Of the 33,525 records which could be found in both datasets, 86% matched on UKPRN, 91% matched on mode of study, and 85% matched on level of study; nearly 79% of records matched on both provider and mode of study.

Mismatches at the level of UKPRN were most often the result of null data in Graduate Outcomes; of the records which did not match on UKPRN, 88% had a null value for the Graduate Outcomes variable UCNAME. Of the records which did not match on mode of study, 27% were the result of null data, and 46% were the result of graduates recording themselves as engaged in full-time study when the Student record indicated that they were enrolled part-time; the majority of these mismatches by mode of study occurred at the postgraduate (taught) level. Mismatches on level of study seemed to stem from a level of graduate uncertainty about the official levels of different qualifications, with approximately 10% of graduates who identified themselves as engaged in a

postgraduate (research) course recorded in the Student record as enrolled on a postgraduate (taught) course, and approximately 70% of those who said they were studying for a professional qualification likewise enrolled on a postgraduate (taught) course.

Of the 21,840 records which could be found in Graduate Outcomes, but not the Student record, 15,755 stated that they were currently engaged in further study, while 6,090 reported that they were due to start further study in the next month; the 6,090 graduates due to start further study would not yet be expected to be in the Student record. Of the 15,755 respondents who recorded themselves as currently engaged in further study, nearly two thirds were not aiming for a formal qualification, were studying for a professional qualification, or were studying for a type of qualification not mentioned in the survey; graduates engaged in these types of study, like those who had not yet started their course of study, would not necessarily be expected to be in the Student record.

Of the 40,430 records which could be found in the Student record, but not in Graduate Outcomes, 29,595 (73%) represent members of the target population who did not respond to the Graduate Outcomes survey. Of the 10,835 respondents who could be found in further study in the Student record, but did not report themselves as engaged in further study in the Graduate Outcomes survey, 74% identified themselves as engaged in employment, 15% said they were unemployed, and 11% said they were engaged in some other activity. 66% of the 10,835 respondents said they had undertaken further study since graduation; of those, approximately one third were within 30 days of their course end date during census week, so it is possible that they had completed most or all of the formal requirements of their course and therefore considered themselves to be no longer in study.

The work which has so far been carried out on linked Graduate Outcomes and Student data suggests that, where individuals can be found in both datasets, the two datasets match quite closely, which in turn suggests that the Graduate Outcomes data is generally robust. The cases in which individuals who should be identifiable in both datasets can only be found in one have raised a number of questions for us to pursue in further quality investigations and assessments of the survey instrument. Some of these questions surround the use of a more detailed linked dataset to help us better understand areas of mismatch, some surround the potential use of other relevant datasets to enhance our quality assurance capabilities, and some surround additional guidance which might help respondents provide fuller information about their further study.

3.5.2.2. Graduate Outcomes and external data on graduates

The LEO dataset, which was first published in 2017, brings together education data from the Department for Education (DfE) along with employment, earnings, and benefits data from the Department for Work and Pensions (DWP) and Her Majesty's Revenue and Customs (HMRC). Using these sources, LEO provides earnings and benefits information for graduates one, three, five, and ten years after completion of their qualifications; it also includes data on personal characteristics (gender, ethnicity, and age), university attended, subject studied, qualification achieved, and graduate movement between home region, provider region, and current region.²¹⁶

Unlike Graduate Outcomes, which, as a survey, depends on the individual responses of graduates, the LEO dataset is drawn from administrative data and includes information on all graduates from English providers in paid work in the UK; since LEO earnings data comes directly from HMRC, it is

²¹⁶ Department for Education. 2021. *Tax Year 2018/19. Graduate Outcomes (LEO)*. <https://explore-education-statistics.service.gov.uk/find-statistics/graduate-outcomes-leo/2018-19>

free of some of the risks of inaccuracy inherent in self-reported salary data. LEO does not, however, include data on hours worked, so it is not possible to distinguish between graduates who are in full-time work and those who are working part-time; this can be a particular issue for data on female graduates, who are more likely to be working part-time than their male counterparts.²¹⁷ LEO also does not include data on graduates doing voluntary or unpaid work, and, because the LEO earnings data does not include self-assessment earnings, LEO data on graduates in self-employment cannot be entirely representative.²¹⁸ LEO data, moreover, does not include information about occupation; the LEO record tells us what graduates earn, but it does not give us any further information about what graduates do.²¹⁹

Graduate Outcomes and LEO thus provide different pictures of the graduate population in the UK. One of the goals in the design of the Graduate Outcomes survey was to provide statistical outputs which could contextualise data on graduates from other sources, such as LEO, and this goal is reflected in the breadth of information collected in the Graduate Outcomes survey.²²⁰ While the LEO dataset provides data on a small number of variables for most graduates in the UK, and while it, moreover, tracks changes in earnings over time, the Graduate Outcomes survey provides a more detailed picture of each annual cohort at a single point in their post-university careers. The LEO dataset measures graduate outcomes only in terms of whether graduates are in paid employment and, if so, how much they are earning, while the Graduate Outcomes survey collects a broader range of information about what graduates are doing and how they feel about it.

While LEO is specifically geared towards collecting data about employment outcomes for higher education graduates, the LFS is a household survey designed to collect data about the employment circumstances of the UK population as a whole. It was first run in 1973 as a biennial survey and shifted to an annual survey in 1984; since 1992, the LFS has been collected quarterly, with a switch from seasonal to calendar quarters in 2006. Households participating in the LFS are surveyed for five consecutive quarters, with a fifth of the overall sample being replaced each quarter. Where LEO collects administrative data on all graduates in employment in the UK, the LFS is administered to a systematic sample of approximately 35,000 households in Great Britain, plus approximately 2,500 households from Northern Ireland; conclusions about overall patterns in employment circumstances are thus drawn from a relatively small portion of the UK population.²²¹

²¹⁷ Due to the limitations of LEO as a representative measure of female earnings, researchers from the Institute for Fiscal Studies chose to focus on the earnings of sons in their recent report for the Social Mobility Commission, *The Long Shadow of Deprivation*:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/923623/SMC_Long_shadow_of_deprivation_MAIN_REPORT_Accessible.pdf

²¹⁸ Department for Education. 2017. *Employment and earnings outcomes for higher education graduates by subject and institution: experimental statistics using the Longitudinal Educational Outcomes (LEO) data*.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718225/LEO_18_2017_LEO_mainText.pdf

²¹⁹ Office for Statistics Regulation. 2019. *Exploring the public value of statistics about post-16 education and skills in England*. Office for Statistical Regulation Systematic Review Programme.

<https://www.statisticsauthority.gov.uk/publication/exploring-the-public-value-of-statistics-about-post-16-education-and-skills-in-england/>

²²⁰ Further discussion of the goals which shaped the design of the of the survey can be found in relevant sections of the Graduate Outcomes Survey methodology; see <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/understanding-outcomes> and <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/review-topics>

²²¹ Office for National Statistics. 2018. *Labour Force Survey User Guide, Volume 1: LFS Background and Methodology*. Available from:

Unlike the LFS, which is concerned with the entire UK labour force, Graduate Outcomes is concerned only with those who have completed HE qualifications in a given year, and, while there will inevitably be some level of non-response, Graduate Outcomes aims to collect data from the entire target population. With 361,215 responses in the first year and 380,980 in the second, the Graduate Outcomes sample is thus much larger than the annual sample collected by the LFS, despite the narrower focus of the Graduate Outcomes survey.²²²

Although both Graduate Outcomes and the LFS include questions about employment and education, the focuses of the two surveys are different. The LFS is primarily focused on employment, but participants are also asked to respond to the ONS4 SWB questions and to a series of questions about their educational attainment.²²³ Since not all LFS respondents have the same educational qualifications, the educational information collected in the survey allows for some comparison of outcomes between people with different educational histories. All Graduate Outcomes respondents, on the other hand, are higher education graduates, so different comparisons are possible; rather than encouraging comparisons between graduates and non-graduates, Graduate Outcomes encourages comparisons between different categories of graduates.

Respondents to the LFS can be at any stage in their careers; for those who have higher education qualifications, this means that they may be selected to participate in the LFS shortly after finishing their qualifications, or they may be selected many years later. Even within the subset of LFS respondents with higher education qualifications, there will therefore be a wider variation in experiences and possible outcomes than is likely to be visible in Graduate Outcomes, where graduates are deliberately surveyed at the same point in their post-university careers. While Graduate Outcomes provides a cross-section of the experiences of higher education graduates 15 months after finishing their qualifications, the LFS can provide glimpses into what their lives may be like at a variety of different points.

If we are looking for a complete picture of what happens to higher education graduates in the UK, Graduate Outcomes, LEO, and the LFS all fill in different pieces of the puzzle. Although the datasets could fruitfully be used in conjunction with each other – the use of the same set of SWB questions in Graduate Outcomes and the LFS might, for example, allow for some research into the comparative SWB of graduates and non-graduates – in making any comparison between the three data sources, it will be important to recognise the differences in methodology and coverage between the sources. To return to the example of SWB comparisons, although LFS and Graduate Outcomes respondents answer the same four questions about SWB, they are faced with those questions at different points in their careers, and differences in SWB may depend on a range of factors not necessarily connected to education.

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/labourforcesurveyuserguidance>

²²² HESA 2021. *Graduate Outcomes Cohort D Review: C18071 2018/19*.

<https://www.hesa.ac.uk/files/End%20of%20cohort%20D%20report%20C18071.pdf>

HESA. 2020. *Graduate Outcomes Cohort D Review: C17071 2017/18*.

<https://www.hesa.ac.uk/files/End%20of%20cohort%20D%20report.pdf>

²²³ Office for National Statistics. 2020. *Labour Force Survey User Guide, Volume 2: User guide to the LFS questionnaire*.

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/labourforcesurveyuserguidance>

In addition to enabling careful comparisons between graduates and the population as a whole or between different stages in graduates' careers, the existence of other datasets with overlapping domains is likely to be important in the future development of Graduate Outcomes. When LEO data was first published, the DfE conducted a comparison between the LEO and DLHE datasets; HESA has in the past carried out similar comparisons in order to check the quality of DLHE salary data, and a further, detailed comparison of LEO and Graduate Outcomes would provide useful information about the respective strengths and weaknesses of the two datasets.²²⁴ HESA also hopes in future years to explore the possibility of linking the Graduate Outcomes record with other relevant datasets, including LEO salary data.²²⁵ Doing so will not only allow us to streamline our collection processes, but also, and perhaps more importantly, it will allow us to provide a fuller view of the trajectories of graduates after they leave higher education.

3.5.3. COMPARABILITY AND TIME SERIES

3.5.3.1. Graduate Outcomes and DLHE

When the new Graduate Outcomes survey was being designed, the outputs developed from the DLHE data were seen to have value, and it was therefore decided to begin iterating from the DLHE approach in designing the new survey.²²⁶ Nevertheless, Graduate Outcomes is an entirely new survey, and important differences in timescale, methodology, and survey questions between Graduate Outcomes and DLHE make it impossible for direct comparisons to be made between data from the two surveys.

For the DLHE survey, graduates were contacted six months after the completion of their qualifications; Graduate Outcomes surveys graduates 15 months after the completion of their qualifications, that is, nine months later than they would have been surveyed for DLHE. Graduates surveyed for Graduate Outcomes are therefore at a very different stage in their post-HE careers than those who were surveyed for DLHE, which means that comparing the outcomes of respondents to the two surveys will not be a like-for-like comparison.

Methodological differences between DLHE and Graduate Outcomes are another reason to avoid direct comparisons between the two surveys. DLHE was a survey of graduates conducted by providers, whereas Graduate Outcomes is a survey of graduates directly; thus where DLHE was administered by providers who then returned data to HESA for processing and analysis, Graduate Outcomes is administered centrally. For DLHE, SOC coding was done by providers, whereas SIC and SOC coding for Graduate Outcomes is outsourced to the business data services company Oblong.²²⁷ The central administration of both the Graduate Outcomes survey itself and its SIC and SOC coding ensures a greater degree of consistency than was possible with the DLHE survey.

²²⁴ Department for Education. 2016. *Employment and earnings outcomes for higher education graduates: experimental statistics using the Longitudinal Educational Outcomes (LEO) data*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/543794/SFR36-2016_main_text_LEO.pdf

²²⁵ HESA. *Key principles of Graduate Outcomes*. <https://www.hesa.ac.uk/innovation/outcomes/about/principles>

²²⁶ See the section of the Graduate Outcomes Survey methodology on the review of the data items collected in DLHE and LDLHE: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/review-topics>

²²⁷ For more detail on SIC and SOC coding methodology, see <https://www.hesa.ac.uk/definitions/operational-survey-information#data-classification-sicsoc>

Finally, although the two surveys cover similar ground, the specific questions asked by the two surveys are different. The list of activities which can be selected by respondents to Graduate Outcomes is different from the list available to DLHE respondents; the Graduate Outcomes survey gives respondents more options and, in particular, allows graduates who are in work to be more specific about the type of work they are doing. In addition to asking for more detail about areas which received less emphasis in the DLHE survey, Graduate Outcomes also includes new questions, such as the graduate voice questions, which reflect the new survey's emphasis on providing metrics for graduate success beyond employment and salary; similarly, the SWB questions, which were previously used in the final iteration of LDLHE, have been made part of the core Graduate Outcomes survey. Given these differences in survey design, much of the Graduate Outcomes data will have no direct equivalent in DLHE.

Having decided to replace DLHE with a new and fundamentally different survey, HESA has taken the decision not to undertake, publish, or otherwise disseminate any comparisons of data between the Graduate Outcomes survey and the DLHE survey. We likewise advise all users of the two surveys to avoid making any direct comparisons between the two datasets. The two surveys are not directly comparable and any attempts to make direct comparisons are likely to lead to questionable results which are open to misinterpretation.²²⁸

3.5.3.2. The impact of the Covid-19 pandemic

The first UK cases of Covid-19 were confirmed at the end of January 2020, about two thirds of the way through the Cohort A survey period for year two of Graduate Outcomes. The World Health Organization declared that the outbreak of Covid-19 was a pandemic on 11 March 2020, shortly after the end of the Cohort B census week. The first UK lockdown, which was agreed in all four nations, was announced on 23 March, and, despite some easing during summer 2020, different levels of pandemic-related restrictions remained in force throughout the rest of the second year of Graduate Outcomes surveying. Given the far-reaching effects of the Covid-19 pandemic on all aspects of daily life in the UK and around the globe, including employment and study, HESA endeavoured to respond appropriately to the pandemic in its handling of the Graduate Outcomes survey and publications.

Although no changes could be made to the survey for Cohort B, Cohort C offered an opportunity to consider whether any changes could be made which would improve the quality of data collected under pandemic circumstances. From the start of Cohort C, two changes were made to the survey with the goals of allowing interviewers to support respondents and helping respondents describe their current circumstances accurately. First, supportive text was added to the wellbeing questions, signposting mental health and wellbeing organisations around the world. Second, additional guidance was added to the activity questions, instructing furloughed graduates to select the option 'paid work for an employer'. Changes to the place of work and salary questions were also considered, given the shift to remote working and the possibility of furloughed graduates reporting lower salaries, but it was decided that changing these questions in the short term would be likely to introduce additional uncertainty rather than adding clarity; these questions, however, are currently undergoing a process of fundamental review.

²²⁸ See the dissemination section of the Graduate Outcomes Survey methodology: <https://www.hesa.ac.uk/data-and-analysis/graduates/methodology/dissemination>

After the second year of Graduate Outcomes data was received, HESA undertook a programme of analysis to determine the impact of the pandemic on data quality. We compared year two response rates to those from year one, both overall and for graduates with different characteristics, in order to determine whether the circumstances of the pandemic seem to have made some groups less likely to respond to the survey. Since the effects of the pandemic were likely to have been more pronounced for the later cohorts of year two, we also looked at response rates by cohort, comparing year two cohorts with the equivalent cohorts from year one.

Our analysis showed that the year two Graduate Outcomes data remained robust despite the changing circumstances under which it was collected. Response rates for year two remained for the most either stable or slightly higher than equivalent rates for year one; this was true both overall and when response rates were broken down by personal characteristics. Although there were some differences by cohort, these differences for the most part matched the cohort-level differences which were visible in year one. While there were some changes in graduate activities between year 1 and year 2, including a 1.5 percentage point rise in graduates in reporting themselves as unemployed and a 47% decrease in the percentage of graduates taking time out to travel, these changes are likely to reflect real changes in what graduates were doing during the pandemic rather than problems with the quality of the Graduate Outcomes data.

A fuller discussion of the results of our investigation into the effects of the Covid-19 pandemic on Graduate Outcomes can be found in the accompanying insight brief, *The impact of the Covid-19 pandemic on Graduate Outcomes 2018/19*, published on the HESA website.²²⁹

²²⁹ <https://www.hesa.ac.uk/insight/20-07-2021/impact-covid-19-graduate-outcomes>

4. CONCLUSION

The Code of Practice for Statistics is based on three pillars: trustworthiness, quality, and value.²³⁰ In order to comply fully with the Code of Practice, producers of statistics must ensure that the statistics they produce reflect these three attributes. While this report has been primarily concerned with assessing the Graduate Outcomes survey in terms of quality, the mutually supportive nature of the three pillars means that any assessment of statistical quality will also, of necessity, have implications for the trustworthiness and value of the statistics in question.

Statistical trustworthiness depends on the conditions of statistical production. If statistics are to be trustworthy, there must be a high degree of public confidence in the people and organisations responsible for producing them. This confidence must extend to the honesty and integrity of statistical producers, to their independence, to their commitment to the orderly release of statistics, to the transparency of their operating processes, to their professional capability, and to their standards of data governance.

In producing this report on the Graduate Outcomes survey and the statistical outputs derived from it, we hope to have shed some additional light on the processes underlying the design and implementation of the survey, the processing of survey data, and the production of statistical outputs. In so doing, we have contributed to the transparency of HESA's operations, as required in section T4 of the Code of Practice; we hope that increased transparency will give users the information they need to have confidence also in the other elements which contribute to statistical trustworthiness. By explaining the processes by which we assess the accuracy and reliability of our data, for example, we hope to give users of the Graduate Outcomes survey confidence in the professional capability of HESA and the partner organisations involved in survey administration and data processing; similarly, by discussing the efforts we have taken to protect personal information, we hope to give users confidence in our data governance practices.

Statistical quality is a characteristic of the statistical products themselves. It is not sufficient for statistical products to be produced in a trustworthy fashion; instead, the Code of Practice for Statistics stipulates that 'the statistics must be the best available estimate of what they aim to measure'.²³¹ Producing high quality statistical outputs depends on collecting data from suitable sources, on employing sound methodology in the collection, processing, and analysis of data, and on being able to provide users with clear information about how the quality of data and statistics has been assured.

Over the course of this quality report, we have guided users of the Graduate Outcomes survey through the processes used by HESA to assess the quality of the survey and the resulting statistical outputs. At each stage in the development and implementation of Graduate Outcomes, from the inception of the NewDLHE review in July 2015 to the first Graduate Outcomes data releases in June 2020, HESA considered how best to ensure that Graduate Outcomes would be a high quality survey, leading to high quality official statistics outputs. The survey was designed both to capture relevant data about the experiences of graduates after course completion and to reach as many members of our target population as possible. Rigorous quality assurance processes were built into our data collection and processing systems, and we have continued to take user feedback onboard and refine our methodology at each stage of the process.

²³⁰ Code of Practice for Statistics. Introduction, Section xii. <https://code.statisticsauthority.gov.uk/wp-content/uploads/2018/02/Code-of-Practice-for-Statistics.pdf>

²³¹ Code of Practice for Statistics. Introduction, Section xiv. <https://code.statisticsauthority.gov.uk/wp-content/uploads/2018/02/Code-of-Practice-for-Statistics.pdf>

Since the completion of first full cycle of collection, processing, and publication, HESA has continued to work to improve the quality of our data. In addition to our routine quality assurance work, we have also embarked on a complete post-implementation review of the Graduate Outcomes survey. For the last six months, a number of work streams have been involved in developing recommendations for the Graduate Outcomes Steering Group with the goal of ensuring that future iterations of the survey yield data which remains as relevant, reliable, accessible, timely, and coherent as possible.

The final pillar of the Code of Practice for Statistics is value. While trustworthiness and quality refer to how statistics are produced and the nature of the statistics themselves, statistical value depends on whether statistical products are fit for purpose. As is stated in the opening sentence of the introduction to the Code of Practice, 'official statistics are an essential public asset.'²³² Official statistics thus exist for the benefit of their users, and neither the quality of outputs nor the trustworthiness of their production can make up for a failure to consider user needs for statistics that contribute usefully to issues of public concern.

HE providers have collected information on the destinations of their graduates since at least the 19th century; as participation in higher education has expanded and debates about the value of higher education have grown increasingly prominent, the appetite for data on graduates has increased. In designing and implementing the new Graduate Outcomes survey, HESA has worked to iterate from and improve upon DLHE; we have retained questions from DLHE which were deemed to have value, but we have also refined old questions and added new questions to provide additional insight. Having worked with key users to design a survey that collects data on the most relevant questions about the outcomes of graduates, HESA aims to produce statistical outputs which present that data as clearly and accessibly as possible. The Graduate Outcomes data releases and supporting materials affirm our commitment to the principles of open data, and, even more importantly, they also ensure that all of our users have access to statistical outputs designed to meet their needs.

²³² Code of Practice for Statistics, Introduction. <https://code.statisticsauthority.gov.uk/wp-content/uploads/2018/02/Code-of-Practice-for-Statistics.pdf>

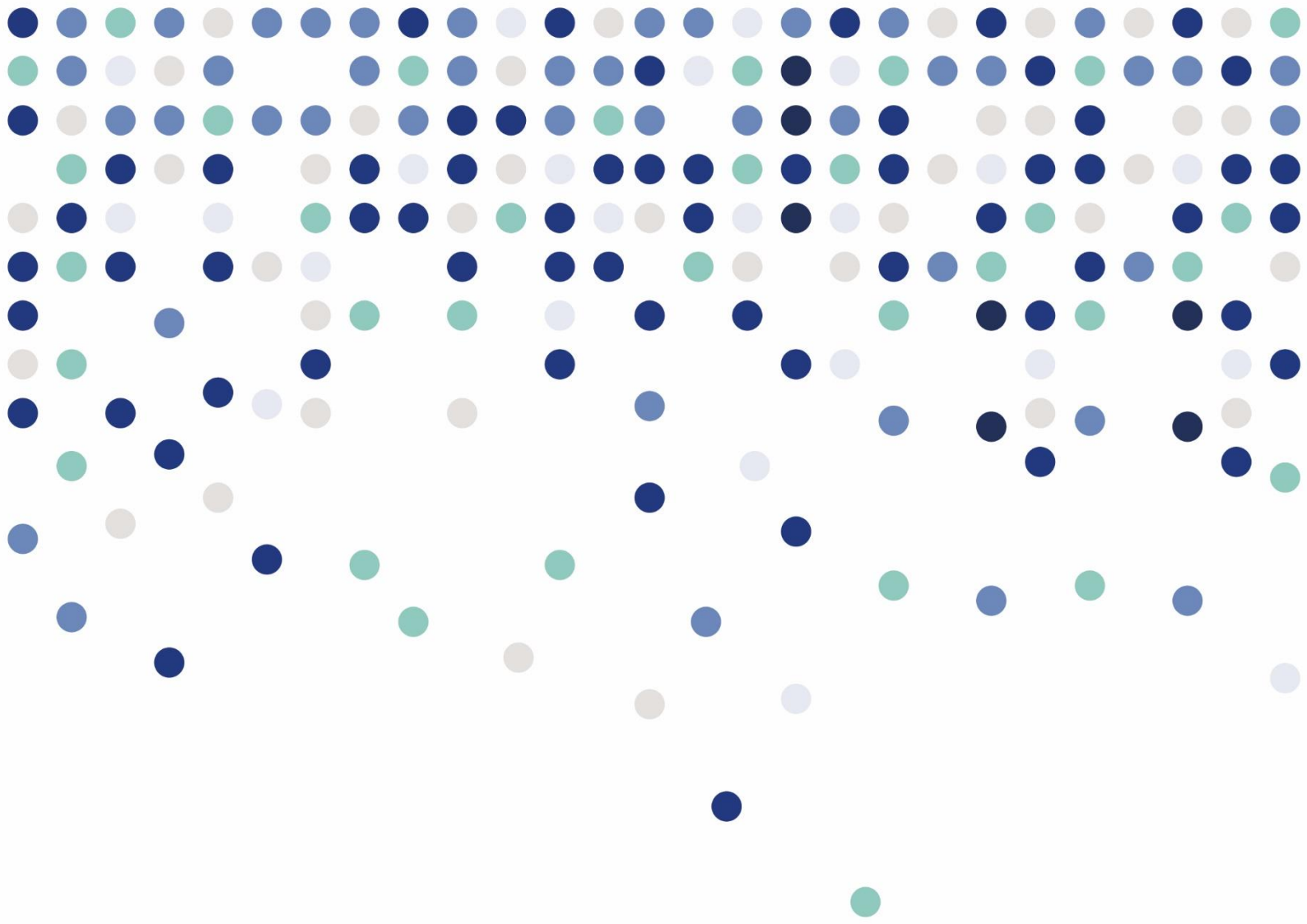
5. REFERENCES

- AAPOR - Prepared for the AAPOR Executive Council by a Task Force operating under the auspices of the AAPOR Standards Committee, with members including: Baker, R., Blumberg, S. J., Brick, J. M., Couper, M. P., Courtright, M., Dennis, J. M., Dillman, D., Frankel, M. R., Garland, P., Groves, R. M., Kennedy, C., Krosnick, J., Lavrakas, P. J., Lee, S., Link, M., Piekarski, L., Rao, K., Thomas, R. K., & Zahs, D. (2010). Research Synthesis: AAPOR Report on Online Panels. *Public Opinion Quarterly*, 74(4), 711–781. <https://doi.org/10.1093/poq/nfq048>
- Arab, M., Rafiei, H., Safarizadeh, M., Ahmadi, J. and Safarizadeh, M. (2016). 'Stress, anxiety and depression among medical university students and its relationship with their level of happiness'. *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 5(1), 44-47.
- Brown, J. L., Vanable, P. A., & Eriksen, M. D. (2008). Computer-assisted self-interviews: a cost effectiveness analysis. *Behavior research methods*, 40(1), 1–7. <https://doi.org/10.3758/brm.40.1.1>
- Curtin, R., Presser, S., & Singer, E. (2000). 'The effects of response rate changes on the index of consumer sentiment'. *Public Opinion Quarterly*, 64(4), 413–428. <https://doi.org/10.1086/318638>
- Chang, L., & Krosnick, J. A. (2010). Comparing Oral Interviewing with Self-Administered Computerized Questionnaires: An Experiment. *Public Opinion Quarterly*, 74(1), 154–167. <https://doi.org/10.1093/poq/nfp090>
- DAMA UK Working Group on 'Data Quality Dimensions'. (2013). The six Primary dimensions for Data Quality assessment. 17. <https://silo.tips/download/the-six-primary-dimensions-for-data-quality-assessment>
- Data Management Association. (2017). *DAMA-DMBOK: data management body of knowledge* (S. Earley & D. Henderson (eds.); 2nd edition). Technics Publications.
- De Leeuw, E. D. (2018) Mixed-Mode: Past, Present, and Future. *Survey Research Methods*, 12(2), 75-89. <https://doi.org/10.18148/srm/2018.v12i2.7402>
- De Leeuw, E. D., Hox, J., & Huisman, M. (2003). Prevention and Treatment of Item Nonresponse. *Journal of Official Statistics*, 19(2), 153–176. <https://www.scb.se/contentassets/ca21efb41fee47d293bbee5bf7be7fb3/prevention-and-treatment-of-item-nonresponse.pdf>
- Department for Business, Innovation and Skills. (2013). Privately funded providers of higher education in the UK (BIS Research Paper No. 111). Department for Business, Innovation and Skills. <https://www.gov.uk/government/publications/privately-funded-providers-of-higher-education-in-the-uk>
- Department for Education. (2021). *Tax Year 2018/19: Graduate Outcomes (LEO)*. <https://explore-education-statistics.service.gov.uk/find-statistics/graduate-outcomes-leo/2018-19>
- Department for Education. (2020). *Graduate Outcomes (LEO): employment and earnings outcomes for higher education graduates by subject studied and graduate characteristics in 2017/18*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/874410/2020_03_HE_LEO_main_text.pdf
- Department for Education. (2020b). *Statistics: higher education graduate employment and earnings*. <https://www.gov.uk/government/collections/statistics-higher-education-graduate-employment-and-earnings>
- Department for Education. (2017). *Employment and earnings outcomes for higher education graduates by subject and institution: experimental statistics using the Longitudinal Educational Outcomes (LEO) data*.

- https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718225/SFR_18_2017_LEO_mainText.pdf
- Department for Education. (2016). *Employment and earnings outcomes for higher education graduates: experimental statistics using the Longitudinal Educational Outcomes (LEO) data*.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/543794/SFR36-2016_main_text_LEO.pdf
- Dolan, P., & Kavetsos, G. (2016) Happy talk: mode of administration effects on subjective well-being. *Journal of Happiness Studies*, 17 (3). pp. 1273-1291. 10.1007/s10902-015-9642-8
- Dolan, P., Peasgood, T. and White, M. (2008) Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology*, 29(1), pp.94-122.
- Duffy, B., Smith, K., Terhanian, G. and Bremer, J. (2005). 'Comparing data from online and face-to-face surveys', *International Journal of Market Research*, 47(6), 615-639.
- Elias, P. and R. Ellison. (2012). 'Standard Occupational Classification (2010) for the Destinations of Leavers from Higher Education: SOC 2010 (DLHE)'. Warwick Institute for Employment Research. <https://www.hesa.ac.uk/collection/c14018/download/soc2010dlhe.pdf>
- European Statistical System Committee. (2017). *European Statistics Code of Practice*.
<https://ec.europa.eu/eurostat/documents/4031688/8971242/KS-02-18-142-EN-N.pdf/e7f85f07-91db-4312-8118-f729c75878c7>
- Groves, R. M. (2004). *Survey Errors and Survey Costs*. John Wiley & Sons.
https://web.archive.org/web/20170815225014id_/http://www.qbv.de/dms/zbw/388565756.pdf
- Higher Education and Research Act 2017*. Available at:
<http://www.legislation.gov.uk/ukpga/2017/29/contents/enacted>
- Horn, L R. (2018) *Contradiction*, in Zalta, E N. (ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2018 Edition), <https://plato.stanford.edu/archives/win2018/entries/contradiction/>
- Hunt, S., & Boliver, V. (2019). Private providers of higher education in the UK: mapping the terrain. Working paper no. 47. <https://www.researchcghe.org/perch/resources/publications/to-publishwp47.pdf>
- International Conference of Labour Statisticians. 2013. *Resolution I: Resolution concerning statistics of work, employment and labour underutilization*. ILO Department of Statistics (ILOSTAT). http://www.ilo.ch/wcmsp5/groups/public/---dgreports/---stat/documents/normativeinstrument/wcms_230304.pdf
- Joinson, A., Woodley, A., Reips, U D. (2007) Personalization, authentication and self-disclosure in self-administered Internet surveys. *Computers in Human Behavior*, 23(1):275-285.
- Józsa, K., & Morgan, G. A. (2017). Reversed items in Likert scales: Filtering out invalid responders. *Journal of Psychological and Educational Research*, 25(1), 19.
http://real.mtak.hu/86132/1/Jozsa_Morgan_JPER_2017_25_1_7_25_u.pdf
- Keeter, S., Miller, C., Kohut, A., Groves, R. M., & Presser, S. (2000). 'Consequences of reducing nonresponse in a national telephone survey'. *Public Opinion Quarterly*, 64(2), 125–148.
<https://doi.org/10.1086/317759>
- Kocar, S., & Biddle, N. (2020). Panel mixed-mode effects: Does switching modes in probability-based online panels influence measurement error? *CSRM & SRC Methods Papers*, 1, 28.
https://csrcm.cass.anu.edu.au/sites/default/files/docs/2020/2/Panel_mixed_mod_effects_does_switching_modes_in_probability_based_online_panels_influence_measurement_error.pdf
- Koch, A., & Blohm, M. (2016). *Nonresponse Bias*. GESIS Survey Guidelines.
https://doi.org/10.15465/GESIS-SG_EN_004

- Lensvelt-Mulders, G.J. and Boeije, H.R., 2007. Evaluating compliance with a computer assisted randomized response technique: a qualitative study into the origins of lying and cheating. *Computers in Human Behavior*, 23(1), pp.591-608.
- Loosveldt, G. and Billiet, J., 2002. Item nonresponse as a predictor of unit nonresponse in a panel survey. *Journal of Official Statistics*, 18(4), p.545.
- McDonald, J. B., Sorensen, J., & Turley, P. A. (2013). Skewness and kurtosis properties of income distribution models. *Review of Income and Wealth*, 59(2), 360–374.
<https://doi.org/10.1111/j.1475-4991.2011.00478.x>
- McNeeley, Susan. (2012). Sensitive Issues in Surveys: Reducing Refusals While Increasing Reliability and Quality of Responses to Sensitive Survey Items. [10.1007/978-1-4614-3876-2_22](https://doi.org/10.1007/978-1-4614-3876-2_22)
- Office for National Statistics. (2020). *Labour Force Survey User Guide, Volume 2: User guide to the LFS questionnaire*.
<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/labourforcesurveyuserguidance>
- Office for National Statistics (2019). *A guide to labour market statistics*.
<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/aguidetolabourmarketstatistics#introduction>
- Office for National Statistics. (2018). *Personal well-being user guidance*.
<https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/methodologies/personalwellbeingsurveyuserguide>
- Office for National Statistics. (2018b). *Labour Force Survey User Guide, Volume 1: LFS Background and Methodology*.
<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/labourforcesurveyuserguidance>
- Office for National Statistics. (2016). *SOC 2010*.
<https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassificationsoc/soc2010>
- Office for National Statistics. (2016b). *UK SIC 2007*.
<https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007>
- Office for National Statistics. (2015). The Coherence and Accessibility of Official Statistics on Income and Earnings. Monitoring Review 1.15. https://uksa.statisticsauthority.gov.uk/wp-content/uploads/2015/12/images-mr11_tcm97-44425-3.pdf
- Office for National Statistics. (2013). *Guidelines for Measuring Statistical Output Quality*. Version 4.1. <https://www.statisticsauthority.gov.uk/wp-content/uploads/2017/01/Guidelines-for-Measuring-Statistical-Outputs-Quality.pdf>
- Office for National Statistics. (2009). *UK Standard Industrial Classification of Economic Activities 2007 (SIC 2007): Structure and explanatory notes*. Available from
<https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007>
- Office for Statistics Regulation. (2021). *Mark Pont to Jonathan Waller: Higher Education Graduate Outcomes data*. <https://osr.statisticsauthority.gov.uk/correspondence/mark-pont-to-jonathan-waller-higher-education-graduate-outcomes-data/>
- Office for Statistics Regulation. (2020). *Regulatory guidance: Guidance on statistical practice for statistics producers during the coronavirus crisis*. UK Statistics Authority.
<https://osr.statisticsauthority.gov.uk/wp-content/uploads/2020/07/Regulatory-guidance-changing-methods-Coronavirus.pdf>
- Office for Statistics Regulation. (2019). *Exploring the public value of statistics about post-16 education and skills in England*. Office for Statistics Regulation Systematic Review

- Programme. <https://www.statisticsauthority.gov.uk/publication/exploring-the-public-value-of-statistics-about-post-16-education-and-skills-in-england/>
- Peytchev, A., Riley, S., Rosen, J., Murphy, J., & Lindblad, M. (2010). 'Reduction of Nonresponse Bias through Case Prioritization'. *Survey Research Methods*, 4(1), 21–29. <https://doi.org/10.18148/srm/2010.v4i1.3037>
- Ralph, K., Palmer, K. and Olney, J. (2011). Subjective Well-being: a qualitative investigation of subjective well-being questions.
- Reuning, K., & Plutzer, E. (2020). Valid vs. Invalid Straightlining: The Complex Relationship Between Straightlining and Data Quality. *Survey Research Methods*, 14(5), 439-459. <https://doi.org/10.18148/srm/2020.v14i5.7641>
- Rosen, J. A., Murphy, J., Peytchev, A., Holder, T., Dever, J. A., Herget, D. R., & Pratt, D. J. (2014). 'Prioritizing Low Propensity Sample Members in a Survey: Implications for Nonresponse Bias'. *Survey Practice*, 7(1), 1–8. <https://doi.org/10.29115/SP-2014-0001>
- Schouten, B., & Shlomo, N. (2017). 'Selecting Adaptive Survey Design Strata with Partial R-indicators'. *International Statistical Review*, 85(1), 143–163. <https://doi.org/10.1111/insr.12159>
- Social Mobility Commission. (2020). *The long shadow of deprivation: Differences in opportunities across England*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/923623/SMC_Long_shadow_of_deprivation_MAIN_REPORT_Accessible.pdf
- Sułkowski, Ł., 2020. Covid-19 pandemic; recession, virtual revolution leading to de-globalization?. *Journal of Intercultural Management*, 12(1), pp.1-11.
- Sunak, R. 11 March 2020. *Budget Speech 2020*. <https://www.gov.uk/government/speeches/budget-speech-2020>
- UK Statistics Authority. (2018). *Code of Practice for Statistics*. Edition 2.0. <https://code.statisticsauthority.gov.uk/wp-content/uploads/2018/02/Code-of-Practice-for-Statistics.pdf>
- Wagner, J. (2013). 'Adaptive Contact Strategies in Telephone and Face-to-Face Surveys'. *Survey Research Methods*, 7(1), 45–55.
- Weijters, B., Baumgartner, H. and Schillewaert, N. (2013). Reversed item bias: An integrative model. *Psychological Methods*, 18(3): 320-334.



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