SURVEY FUTURES

SURVEY DATA COLLECTION METHODS COLLABORATION

Report 14: Accessibility and inclusivity in self-completion surveys: Evidence review

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Survey Futures is an Economic and Social Research Council (ESRC)-funded initiative (grant ES/X014150/1) aimed at bringing about a step change in survey research to ensure that high quality social survey research can continue in the UK. The initiative brings together social survey researchers, methodologists, commissioners and other stakeholders from across academia, government, private and not-for-profit sectors. Activities include an extensive programme of research, a training and capacity-building (TCB) stream, and dissemination and promotion of good practice. The research programme aims to assess the quality implications of the most important design choices relevant to future UK surveys, with a focus on inclusivity and representativeness, while the TCB stream aims to provide understanding of capacity and skills needs in the survey sector (both interviewers and research professionals), to identify promising ways to improve both, and to take steps towards making those improvements. Survey Futures is directed by Professor Peter Lynn, University of Essex, and is a collaboration of twelve organisations, benefitting from additional support from the Office for National Statistics and the ESRC National Centre for Research Methods. Further information can be found at www.surveyfutures.net.

Research Strand 4 of Survey Futures ("Methods for surveys without field interviewers"), led by Prof Olga Maslovskaya (University of Southampton), focuses on the challenges associated with self-completion general population surveys in both cross-sectional and longitudinal contexts. The strand explores ways to optimise design characteristics, with the aim of achieving more representative samples of the general population. The main challenges associated with self-completion general population surveys are associated with the absence of field interviewers to facilitate recruitment and retention of participants and, additionally in a UK context, the absence of a sampling frame of named individuals. Research Strand 4 has five sub-projects:

(1) Recruitment methods.
(2) Targeted survey procedures.
(3) Population subgroups.
(4) Knock-to-nudge
(5) Within-household selection methods.

This review falls under the sub-project *Population subgroups*.

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Contents

Executive summary 5
1 Introduction 7
1.1 General overview 7
1.2 Excluded and misrepresented population sub-groups 8
1.3 Search criteria for this review 11
1.4 Review structure 12
2 Disabilities and impairments 12
2.1 Visually impaired and blind 13
2.1.1 Definition and context 13
2.1.2 Implications of visual impairment for accessing written material 13
2.1.3 Measures to include visually impaired and blind people in surveys 14
2.2 Deaf and hard of hearing 17
2.2.1 Definition and context 17
2.2.2 Implications of hearing loss for survey participation 17
2.2.3 Measures to include people with hearing loss in surveys 18
2.3 Motor control impairments 21
2.3.1 Definition and context 21
2.3.2 Implications of motor control impairments for survey participation 21
2.3.3 Measures to include people with motor control impairments in surveys 21
2.4 Mental health and neurodevelopmental conditions 22
2.4.1 Definition and context 22
2.4.2 Implications of mental health and neurodevelopmental conditions for survey participation 23
2.4.3 Measures to include people with mental health and neurodevelopmental conditions 23
3 Literacy and language limitations 26
3.1 Literacy 27
3.1.1 Definition and context 27
3.1.2 Implications of low literacy for survey participation 27
3.1.3 Measures to include groups with low literacy 28
3.2 Cultural and linguistic minorities 31
3.2.1 Definition and context 31
3.2.2 Adaptation and translation of survey materials 32
4 Digital exclusion 35

4.1 The digital divide 35
4.1.1 Digital access 35
4.1.2 Digital literacy 37
4.1.3 Digital assimilation 37
4.2 Measures to include the offline population in survey research 38
4.2.1 Mixed-mode designs 38
4.2.2 Equipment provision 38
4.2.3 Including participants with lower digital skills 39
5 Conclusions and recommendations 41
5.1 Summary of the main findings 41
5.2 Discussion 44
5.2.1 The imperative of accessibility and inclusivity 44
5.2.2 Facilitating participation in large-scale probability-based surveys 45
5.2.3 Feasibility of specialised measures to facilitate participation 46
5.2.4 Other issues 47
5.3 Limitations and recommendations for further research 47
References 49

Executive summary

Inclusivity and accessibility are increasingly recognised as essential goals for survey research. Inclusivity involves enabling "*the full range of human diversity to be included and reflected in research, considering, and learning from people of all backgrounds and perspectives*" (Government Analysis Function 2024)[1]. In the context of survey research, *accessibility* is a component of inclusivity that focuses on ensuring individual's functional capacity and the functional demands of survey participation are matched, so that the individual can effectively complete the survey. Changes required to make surveys inclusive and accessible are often beneficial for all respondents. Inclusive survey research, in this context, can be broadly interpreted as that research which takes measures to ensure that exclusion is minimised.

Beyond the moral, ethical, and political imperatives for inclusivity and accessibility, significant trade-offs exist between these goals and practical feasibility. Engaging seldom-heard or hard-to-find population subgroups in social surveys will likely involve costly measures, including multi-mode approaches, boost samples, and/or targeted incentives. Similarly, producing survey materials that improve accessibility for all groups in the population, including making interviews available in braille, sign language, or translated into multiple languages, can be a highly resource-intensive task. This challenge is particularly relevant as surveys increasingly shift towards self-administered modes, making the discussion of effective engagement strategies vital.

This review synthesises evidence on survey inclusivity practices from international academic literature and UK survey practice reports. Its primary focus is on population subgroups willing but unable to participate, termed here as "populations with barriers to participation". These groups are: 1) those with disabilities and impairments (including visual, hearing, motor, mental health, and neurodevelopmental conditions), 2) those with literacy and language issues (including low literacy and linguistic minorities), and 3) the digitally excluded (those with limited access to technology or lower digital skills).

The defining characteristic of these groups is a potential willingness to engage in survey research, where participation is made difficult by issues in recruitment, but also in accessing and using survey materials. The involvement of these groups in survey research can be facilitated by modifying contact strategies, fieldwork methods, interviewing modes, and the materials themselves. The review identifies measures implemented in social survey research to increase participation among these sub-groups and discusses the extent to which they contribute to obtaining high-quality data from representative samples.

A central finding is that including populations with barriers to participation requires offering a range of alternatives in both recruitment and administration. However, the specific approaches vary. Mixed-mode designs are a well-established, effective strategy in probability-based surveys worldwide, as they cater to different preferences and ensure at least one accessible option for each respondent. The effectiveness of more specialised measures, however, remains less certain. Techniques such as audio questionnaires, video-based surveys, or tailored apps may improve participation for specific groups but can be prohibitively expensive. They may not yield substantial improvements in reducing total survey error for general population studies and appear better suited to research targeting specific sub-groups.

[1] https://analysisfunction.civilservice.gov.uk/policy-store/inclusivity-and-accessibility-in-survey-development/

Ultimately, the decision of which measures to adapt will depend on the specific objectives, scope, scale of each individual survey, and budget constraints.

1 Introduction

1.1 General overview

Social survey research seeks to understand social issues and provide useful information to design public policies and assess their effectiveness and contribute to democratic debate. As policy changes may affect different groups and individuals in different ways, surveys should aim to represent a diverse range of experiences from different groups (UK Government 2022). From a statistical perspective, failure to engage certain population sub-groups in surveys can lead to parameter biases or limited generalisability of the results. The consequences are arguably more significant for policy design, as missed insights from excluded or misrepresented groups can lead to decisions that are not fully informed or might even be detrimental for them. Excluding marginalised or disadvantaged groups from survey research might further contribute towards perpetuating inequalities by ignoring their perspectives and experiences (Adley et al. 2023). The ethical implication of exclusion goes beyond these issues, as when individuals find barriers which exclude them from participation in research, they are also being restricted in exercising their rights in society in general (Aidley and Fearon 2021).

Considering this, *inclusivity and accessibility* have been put forward as essential goals for survey research. *Inclusivity* in survey research involves enabling "*the full range of human diversity to be included and reflected in research, considering, and learning from people of all backgrounds and perspectives*" (Government Analysis Function 2024). Inclusive survey design embraces diversity and aims to make sure that all members of the population feel included and can fully participate, regardless of their backgrounds, location, perspectives, and particular conditions.

Accessibility, on the other hand, is a component of inclusivity. In the context of survey research, it can be understood as a state in which an individual's functional capacity and the functional demands of survey participation are matched, so the individual can effectively complete the survey (Rios et al. 2016). For example, a person who does not speak English would still be able to participate in a survey if the demands of the environment (the language used in the survey questionnaire) is matched to the functional capacity (speaking language) of the individual. The focus of accessibility is on the practical steps to removing barriers that prevent certain groups from participating.

The UK Statistics Authority strategy for the 2020–2025 period (UK Statistics Authority 2020) lists "inclusive" as one of the four core principles, which underpin the work of agencies and organisations that conduct surveys in the UK. This means ensuring that statistics and their workforce "*reflect the experiences of everyone in our society so that everyone counts and is counted, and no one is forgotten*" (UK Statistics Authority 2020, p. 13). Similarly, the Government Social Research Strategy 2021-2025 aims to create "*a diverse and inclusive profession: representative of the society we serve through our values, profile and perspectives of our membership*" (Government Social Research 2021, p. 1).

As part of the delivery of this strategy, in 2020, the National Statistician Professor Sir Ian Diamond established the *Inclusive Data Taskforce* to recommend how to make a step-change in the inclusivity of UK data and evidence. According to the taskforce, this change requires the development of a strong culture of trust and trustworthiness, a system-wide approach and real commitment to being more inclusive in what is measured and how; and clarity about what inclusivity means in practice (Office for National Statistics 2021b). As a result of this work,

the Office for National Statistics (ONS) produced a guide to inclusive social research practices from the design stage of research to data analysis and reporting.

The focus on inclusivity is one of the key components of the *respondent-centred design* approach (Wilson and Dickinson 2022), currently used by the ONS for most of their surveys. In this approach, inclusivity in survey research is understood as designing surveys that address the needs of the widest possible groups of potential respondents irrespective of age of ability. The argument is that the changes required to make surveys accessible are often beneficial for *all* respondents. Inclusive survey research, in this context, can be broadly interpreted as that research which takes measures to ensure that exclusion is minimised.

Notwithstanding the moral, ethical, and political arguments for including every group in the population, there are trade-offs in place between survey inclusivity/accessibility and practical feasibility. As suggested by Lynn (2024), engaging seldom-heard or hard-to-find population subgroups in social surveys will likely involve costly measures, including multi-mode approaches, boost samples, and/or targeted incentives. Similarly, producing survey materials, which improve accessibility for all groups in the population, including making interviews available in braille, sign language, or translated into multiple languages, can be a highly resource-intensive task. The United Nations' *Guidelines to Make Surveys on Households and Individuals More Accessible* (2025) acknowledge this trade-off. The guidelines highlight that measures for improving survey accessibility should follow the complementary principles of practicality with external resources (such as sign language interpreters and braille services), and practicality with internal resources (acknowledging time, staffing, and budget constraints faced by survey agencies).

Interviewers play an important role in survey engagement, as they can implement accessibility and inclusivity measures (such as clarifying questions, providing additional information when required, or asking respondents if they need reasonable adjustments to participate) during the interview, enabling participation among respondents who might otherwise find it difficult to complete a survey. In an era where surveys are moving towards self-administered modes, the discussion about the most effective ways to engage respondents in the absence of interviewers is highly relevant. This review provides the evidence about survey inclusivity practices found on the international academic literature and UK survey practice reports. The focus is on identifying the measures that social survey research has implemented to increase survey participation for population subgroups that might find difficulties in engaging with surveys. The review also discusses the extent to which these measures can be helpful for the main objectives of survey research methodology, i.e. obtaining high quality data from representative samples.

1.2 Excluded and misrepresented population sub-groups

Population sub-groups can be excluded or misrepresented in social survey research for various reasons. Lynn (2024) classifies the missing population in two main segments – missing by design or not by design, as depicted in Figure 1.

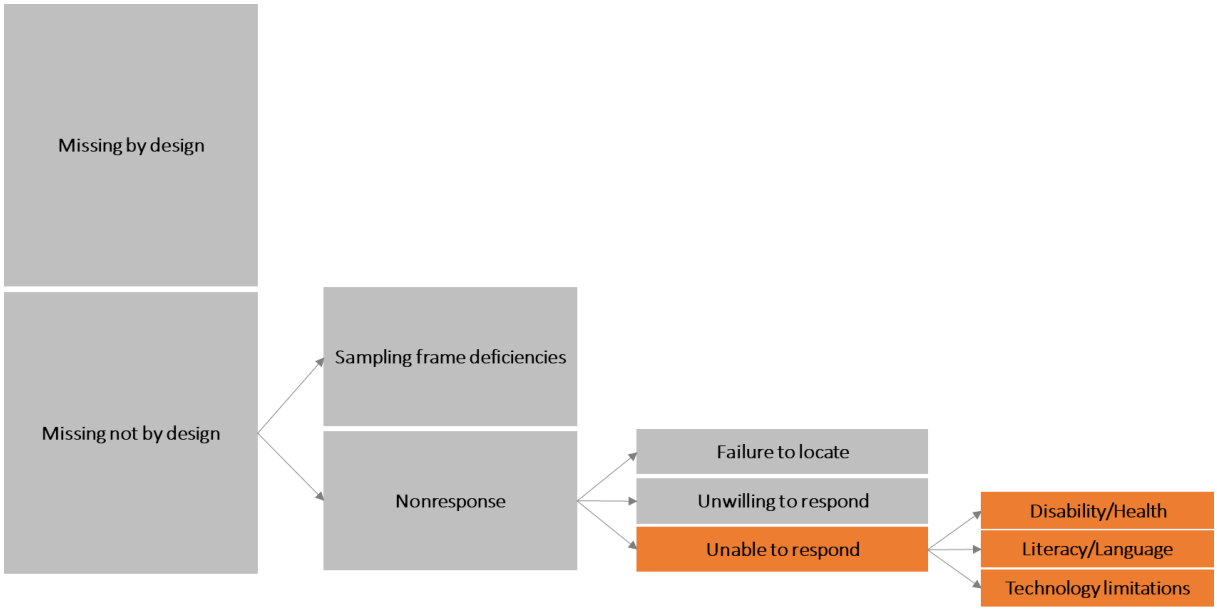

Figure 1. Classification scheme for groups excluded or misrepresented in surveys

Population *missing by design* includes people who reside in communal establishments, usually excluded from household-based sampling framework. Members of this population sub-group reside in prisons, hotels, nursing homes, military barracks, halls of residence, and children's homes (Smith 2015). The second group (*missing not by design*) is arguably more concerning. They are part of the target population but can still be missing due to either deficiencies in the sampling frame or non-response.

Sampling frame deficiencies include problems as: incompleteness, clustering of elements within a single listing, blanks listing or "foreign" listings (i.e. elements not belonging to the target population) in the sampling frame, and duplicate elements (Kish 1965). Incomplete sampling frames can be particularly concerning when considering survey inclusivity, as they result in certain units having a zero probability of selection. This compromises a fundamental principle of probability sampling, as these units are excluded at the design stage.

Non-response is another important source of missing population sub-groups. Lynn (2024) lists three main sources of non-response. First, *contact deficiencies*, or failure to locate or contact respondents, which can be caused by incorrect contact details on the sampling frame (for example, people who change address or phone number frequently) or, in the case of interviewer-administered surveys, an insufficient contact effort by the interviewers (Lynn 2024).. As with sampling frame deficiencies, this source of non-response could potentially be controlled by more frequent sampling frame revision and upgrading, and/or an improved recruitment process, as well as better fieldwork management procedures.

Some members of the population might be *unwilling* to participate. This can be due to several reasons, including trust issues (concerns about data privacy or usage), perceptions of illegitimacy of the survey or social research in general, or other less specific worries that might lead to a reluctance to provide time and information (Bosnjak, Tuten, and Wittmann 2005; Couper 2000; Siegler and Finch 2025). While these are factors that mostly relate to the respondent, they are not independent from design and methodology decisions – unwillingness to participate is more likely when the survey appears irrelevant, difficult, or

intrusive to respondents, or if they do not receive enough information about its purpose, scope, and limitations (Haunberger 2011; Groves and Couper 1998). The survey climate also plays an important role in the willingness to participate in surveys. Maslovskaya and Bianchi (2025) found that older and less educated individuals are more likely to hold negative views of official statistics, have lower levels of trust in the statistics produced by the ONS, and feel less confident that their data will be kept confidential. As a result, these groups are less likely to engage in survey participation.

The "unwilling" group includes population segments that are frequently hard to engage in social surveys. These varies across surveys and geographic contexts but frequently includes people with low socioeconomic status and/or education levels, young people, and people at higher risks of stigma and discrimination. In addition, some groups might be *hidden* from social research because they highly value their privacy and may purposefully conceal their identity from researchers. Often, but not always, hidden populations include individuals who engage in socially less desired, undesired, and at times illegal behaviours (Freeman et al. 2021).

The last segment of population frequently excluded or not sufficiently represented in survey research involves groups who wish to participate but are unable to do so. This evidence review focuses on this group, whose ability to participate might be hindered by several possible conditions, including (as depicted in Figure 1):

1) **Disabilities and impairments**, including visual impairments, hearing loss or deafness, motor control dexterity impairments, mental health and neurodevelopmental conditions.
2) **Literacy and language limitations**, including low literacy and language limitations in linguistic minorities.
3) **Digital exclusion**, including issues with technology access, along with lower digital access, literacy, and assimilation.

Individuals in this group are part of what the literature usually refers to as "seldom heard" (Freeman et al. 2021) or "hard-to-interview" (Tourangeau 2013) groups. For this review, we use the term "**population sub-groups with barriers to participation**", as their defining characteristic is a potential willingness to engage with survey research, where participation is often hampered by difficulties in the initial invitation or in accessing and utilising survey materials. Their involvement can be facilitated by modifying contact strategies, fieldwork methods, interviewing modes, and survey materials.

While making surveys more inclusive and accessible should, in principle, improve participation across all groups of respondents, the United Nations (2025) guidelines on survey accessibility warn that "robust" survey research must acknowledge that "*accessibility measures designed for one type of disability can unintentionally create barriers for others*" (United Nations 2025, p. 6). Close engagement with organisations of persons with disabilities and individuals with disabilities is essential to accommodate a wide range of needs. In this evidence review, we explore measures that can be implemented to improve participation for each of the population sub-groups facing barriers to participation, highlighting those that may also benefit other groups, as well as those that could create barriers for others.

1.3 Search criteria for this review

A systematic search was conducted between June and September 2025 to identify research literature on self-completion surveys for population sub-groups, with a focus on methods, as well as substantive research that applied methods supporting accessibility and inclusivity in survey participation. Searches were carried out in the Web of Science, Scopus, International Bibliography of the Social Sciences, APA PsycInfo, and Academic Search Ultimate databases. Each sub-group was searched separately; however, a core set of general search terms was used across all groups, supplemented with sub-group-specific terms. The search strategy incorporated the following general terms common to all subgroups:

- A topic search in all searchable fields for the terms *"self-completion*" OR "*self-administered*" OR "*postal survey*" OR "*mail survey*" OR "*online survey*" OR "*web survey*" OR "*internet survey*" OR *questionnaire** OR "*computer-assisted self-interview*" AND ("*accessibility*" OR "*inclusivity*" OR "*equity*" OR "*participation*" OR "*engagement*") AND then combined with search terms for specific sub-groups.

Low literacy:

- "*illiteracy*" OR "*illiterate*" OR "*low literacy*" OR "*limited literacy*" OR "*non-literate*" OR "*preliterate*" OR "*low educational attainment*"

Linguistic minorities:

- "*language barrier**" OR "*limited English proficiency*" OR "LEP" OR "*non-native speaker**" OR "*linguistic minority*" OR *multilingual* OR *bilingual*.

Visual impairments:

- *"visual impairment*" OR *"blind"* OR *"blindness"* OR "*low vision*" OR "*partially sighted*" OR "*vision disability*".

Deaf and hard of hearing:

- "*hearing loss*" OR *"deaf*"* OR "*hard of hearing*" OR "*hearing impair**" OR *"DHH"* OR "*deafened*" OR "*sign language*" OR *"ASL"* OR *"BSL"*.

Neurological conditions, neurodivergence, and mental health:

- "*neurological disorder**" OR "*neurological condition**" OR *"neurodiverg*"* OR *"autism"* OR "*autism spectrum disorder**" OR "*attention deficit*" OR *"dyslexia"* OR "*disabilit**" OR "*mental health*" OR "*mental illness*" OR "*psychological disorder**".

Motor control impairment:

- "*motor impairment*" OR "*motor control disorder*" OR "*physical disability*" OR "*neuromotor impairment*" OR "*upper limb disability*".

The search was further refined by document type and included journal articles, review articles, early access papers, book chapters, proceedings papers, reports, and selected grey literature. Only literature published in English was included, while there were no restrictions in terms of publication time.

1.4 Review structure

The following three chapters of this evidence review discuss the three population sub-groups facing barriers to participation. Chapter 2 covers participants with disabilities and impairments, Chapter 3 addresses participants with literacy and language issues, and Chapter 4 examines digitally excluded participants. Each of these chapters provides definitions and context, describes the barriers to participation in survey research, and presents measures that can be adopted to ensure their inclusion. Finally, Chapter 5 summarises and discusses our findings and offers recommendations for further research and for survey practice.

2 Disabilities and impairments

This section provides background on how disability is defined in the UK and context on the prevalence of different types of disabilities in the population, and the issues likely to arise within a survey sample. This can inform decisions about whether to provide special adaptations. There is no longer a national register of people with disabilities in the UK; official statistics are primarily based on self-reported survey data. Estimates of the number of people with disabilities vary depending on the definition, context, and source of information (Kirk-Wade et al. 2024). This lack of consistency presents challenges in estimating their prevalence within the general population. To improve comparability, most official statistics now use a definition of disability based on the harmonised standard from the Government Statistical Service (GSS) (Kirk-Wade et al. 2024). The GSS definition aligns with the core legal concept of disability set out in the Equality Act 2010 for Great Britain and the Disability Discrimination Act 1995 for Northern Ireland. Under these Acts, a person is considered disabled if they have a physical or mental impairment that has a substantial and long-term negative effect on their ability to carry out normal day-to-day activities (GSS 2019). In surveys collecting this information (such as the Annual Population Survey, Continuous Household Survey, Labour Force Survey, Family Resources Survey, Living Costs and Food Survey), respondents are asked:

> *'Do you have any physical or mental health conditions or illnesses lasting or expected to last 12 months or more?'*
>
> *'Does your condition or illness/do any of your conditions or illnesses reduce your ability to carry-out day-to-day activities?'*

If a respondent answers '*yes*' to the long-lasting health conditions or illness question and then either '*yes, a little*' or '*yes, a lot*' to the activity restriction question, they are classified as disabled under the legal definition (GSS 2019). However, this harmonised measure does not capture everyone who is legally disabled under the Equality Act. For example, people with a long-standing illness or condition that does not restrict their activities are not considered disabled according to this definition (GSS 2019; Kirk-Wade et al. 2024). Furthermore, these questions are not intended to replace those used in specialist surveys that require more in-depth analysis of disability (GSS 2019).

Surveys in the UK that now use this harmonised standard include the Continuous Household Survey, English Housing Survey, Family Resources Survey, Labour Force Survey, National Survey for Wales, and Scottish Household Survey, among others (GSS 2019). The most commonly used measure of disability prevalence comes from the Family Resources Survey (FRS), which estimated that in 2023/24, approximately 24% of the total population had a disability (Stiebahl et al. 2025). Table 1 below presents the impairment types reported by disabled people in the UK.

Table 1. Impairment types reported by disabled people in the UK

Impairment type	Children	Working age	State pension age	All ages
Mobility	2	10	31	12
Stamina / breathing / fatigue	2	8	20	9
Mental health	3	12	5	9
Motor impairment / dexterity	1	5	15	6
Memory	1	4	9	4
Learning	4	4	4	4
Hearing	1	2	11	3
Vision	1	2	9	3
Social / behavioural	7	3	0	4
Other	2	4	7	4
At least one of the above	12	24	45	25

Source: Family Resources Survey, financial year 2023 / 24, Department of Work and Pensions (2025).

Note: Respondents can report more than one impairment.

2.1 Visually impaired and blind

2.1.1 Definition and context

Visual impairment refers to a reduction or loss of sight that cannot be corrected by lenses and encompasses a spectrum of conditions ranging from partial to severe impairment (blindness) (Cabinet Office 2023). Approximately 2% of working-age adults and 9% of people of state pension age in the UK report having a visual impairment (Table 1). The impact on daily functioning and the support required varies between individuals depending on the severity of impairment and other factors, such as age and comorbidities (Pigeon et al. 2025). Visual impairment is also associated with reduced access to education (Simui et al. 2018), poorer quality of life (Assi et al. 2021), and lower social participation (Desrosiers et al. 2009; Mick et al. 2018; Salminen and Karhula 2014), all of which may affect participation in social surveys.

2.1.2 Implications of visual impairment for accessing written material

Visually impaired and blind people encounter barriers when participating in general population surveys due to challenges related to the readability and usability of communication materials used in traditional surveys (Kaczmirek and Wolff 2007). In self-completion surveys, materials are typically presented as paper-based text or electronically, which, without adaptations, may not be usable for people with visual impairments. Visually impaired and blind individuals may read using vision, audio, or touch, often with the support of assistive technologies (Wu et al. 2020). To facilitate access to information, associations for visually impaired and blind people provide multiple options for accessing textual materials, and these include large print formats, audio versions, and braille, a tactile writing system that uses raised dots to convey text through touch, with letters and numbers represented by a specific combination of dots (Kaczmirek and Wolff 2007). Text can also be accessed electronically and read aloud using screen reader software or displayed through a braille device. While these aids enhance the visibility of specific parts of the text, sometimes focusing on a single word, this benefit can also become a limitation, as it reduces the ability to retain an overview of the text layout and structure on a page. Therefore, communication materials must be designed with cognitive processes and accessibility standards in mind (Kaczmirek and Wolff 2007).

2.1.3 Measures to include visually impaired and blind people in surveys

The Office for National Statistics (ONS) conducted semi-structured interviews to explore how people with visual impairments experienced key touchpoints and modes of completion in the survey process, using materials from the Transformed Labour Force Survey (TLFS). Participants included people with visual impairments who were technology users as well as low digital users. While technology users reported using magnifiers, text-to-speech software, or desktop scanners to read invitation letters, low digital users were more likely to set letters aside until a family member or external supporter was available, which could delay reading the letter or result in it being misplaced (Davies and Giji 2024; Robinson et al., 2024a).

The interviews highlighted accessibility challenges people with visual impairment might experience with survey materials. For example, text-to-speech phone apps sometimes began reading text presented in coloured boxes (designed for the text to stand out) and omitted preceding content. Coloured backgrounds reduced contrast for magnifier users and made letters harder to read. This also applied to accompanying leaflets, which used coloured backgrounds but also column layouts, which were particularly difficult for text-to-speech users and some participants reported ignoring these materials altogether. Participants reported they preferred black text on a white background for optimal contrast and found text in larger print helpful. The accessibility statement at the top of the letter was positively received by participants as it explained how to request alternative formats. While this offered language assistance, large print or Braille letters, other participants expressed interest in additional accessible formats, such as audio versions or materials delivered by email. For reminders, participants raised concerns about the knock-to-nudge approach, particularly around verifying the legitimacy of fieldworkers, as they could not visually confirm identification or passes (Davies and Giji 2024; Robinson et al., 2024a).

In terms of response modes and considering self-completion methods, for technology users, a key barrier to online completion was whether the survey had been designed and tested for compatibility with screen readers and zoom functions. Some participants reported that a lack of accessibility would lead to frustration and potential non-participation. Additional challenges included transferring web addresses and access codes from paper to digital devices. Despite these barriers, technology users preferred the online mode when accessible, as it enabled independent, convenient, and more anonymous participation. In contrast, low digital users found the online mode stressful and discouraging (Davies and Giji 2024; Robinson et al., 2024a).

Kaczmirek and Wolff (2007) presented guidelines for the design of self-administered surveys for the visually impaired and blind people within a mixed-mode approach based on a survey conducted among the members of the association for the visually impaired and blind people of Baden in Germany. Kaczmirek and Wolff (2007) aimed to develop a braille version, a large font version, and an online version of the questionnaire. Members of the association were invited to participate in the survey and received either a large font version or a braille version of the questionnaire identical to the mode in which they received information material from the association. Each questionnaire informed about the possibility to take the web survey instead of filling out the paper version.

Kaczmirek and Wolff (2007) examined the cognitive concepts that inform survey design for visually impaired and blind people and highlighted key design challenges and potential solutions, such as providing a clear overview of the questionnaire and supporting navigation.

Figure 2 illustrates how visual field restrictions may affect survey question reading when using assistive devices: the light rectangle indicates the portion visible through a magnifier, while the circle represents the reduced field of view associated with tunnel vision (Kaczmirek and Wolff 2007).

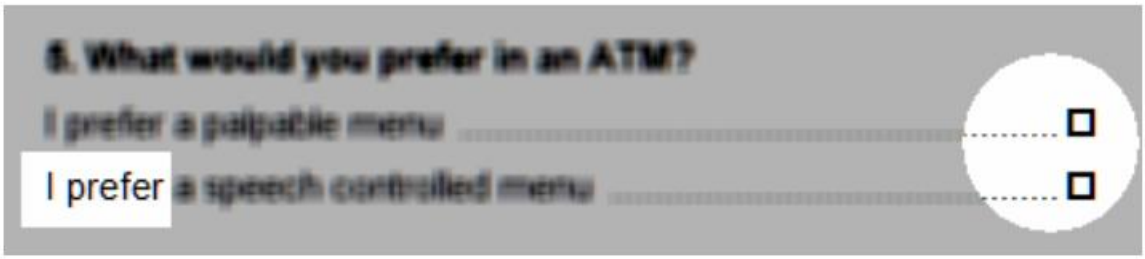

Figure 2. Visual field restrictions

Source: Cited in Kaczmirek and Wolff (2007:377)

People with an impaired visual field who use visual enhancing aids may struggle to get an overview of a survey communication letter or questionnaire, as such aids typically magnify only a small portion of the text at a time (Figure 2). This requires respondents to piece together multiple separate elements to form a full understanding of the page layout. Similar challenges arise when using enlarger devices, braille materials, or screen readers. Kaczmirek and Wolff (2007) suggested that questionnaires should begin with clear information about the length of the survey, such as the number of questions and pages, for a general overview. However, this becomes more complex when routing is involved. Kaczmirek and Wolff (2007) also emphasised the need for explicit participation instructions. For example, in the braille version of their survey, additional guidance was provided on the use of a braille typewriter: respondents were instructed to write the question number and their full text answer and were informed of the availability of "*three sheets of paper suitable for your braille typewriter…*" (p. 378) at the end of the questionnaire. The braille version also specified the number of possible responses for each item (e.g., "*One answer is possible among 3 answers*" [p. 378]). However, Kaczmirek and Wolff (2007) noted that completing a questionnaire with a braille typewriter can be very time consuming, which may negatively affect participation.

In addition to the difficulty of gaining an overview of the questionnaire, Kaczmirek and Wolff (2007) highlighted that people with an impaired visual field are unable to benefit from traditional paper-based questionnaire layouts, and therefore the design must support navigation and orientation. For example, in Figure 2, for respondents using a magnifier or who have tunnel vision, answer options that begin with the same sequence of letters are harder to distinguish. When moving the paper beneath an enlarger to read across a line and then returning to the next line with a single quick movement, respondents may believe they have returned to the same line. As a result, they may move further down the page and unintentionally skip the second answer option. Pretesting indicated that with the fast and habitual movements involved when using enlargers, some questions and especially answer categories were easily overlooked when presented in a traditional survey layout (Kaczmirek and Wolff 2007). Kaczmirek and Wolff (2007) suggested several measures that can support navigation and orientation. These included ensuring that every question begins with a consecutive number, so that each new question is immediately distinguishable. They also recommended the use of empty lines (spacers), but only before each new question and not between the question and its answer options, to ensure that the question and its responses

remain visually grouped. Additionally, they proposed reformulating answer options so that both the beginning and end of each option contain as many different letters as possible while retaining the original meaning. This makes each item easier to differentiate, particularly for respondents using assistive devices.

Wu et al. (2020) conducted an online survey of people with low vision to determine the assistive technologies they use for reading and their preferred text characteristics. The survey was designed to be accessible via screen-magnification and screen-reading software. Participants were recruited through word of mouth and organisations supporting visually impaired people in the United States. Respondents reported the proportion of time they spent reading using vision, audio, or touch (braille). On average, 64% of reading was visual, 33% auditory, and 3% braille. Wu et al. (2020) grouped assistive devices into two categories: digital content magnifiers and hard-copy magnifiers. Digital content magnifiers included hardware or software that magnifies text displayed on digital screens, such as smartphones, tablets, e-book readers, laptops, desktop computers, and screen-magnification software. Zoom functions and larger displays can provide higher levels of magnification for users with low vision. Hard-copy magnifiers were devices designed for reading printed materials and included optical magnifiers (handheld, stand-mounted, and spectacle-mounted), closed-circuit televisions, and portable handheld electronic magnifiers. Magnification apps on mobile devices were also included in this category, as they use the device's camera to enlarge printed text. Wu et al. (2020) found that despite their smaller display size, smartphones were the most frequently used reading devices among participants. The popularity of smart devices, such as smartphones and tablets, among both normally sighted and visually impaired individuals may indicate that built-in accessibility features facilitate their use for reading, despite their smaller display size (Wu et al. 2020) and could form the basis for designing accessible surveys for both population groups.

In terms of preferred text characteristics, Wu et al. (2020) found that a larger proportion of participants (46%) preferred reversed-contrast text (white letters on a black background) compared with 39% who preferred standard black-on-white text. Previous research similarly suggested that some people with low vision read more effectively with reversed-contrast formats (Legge et al. 1985; Silver 1978). With regard to font, the Arial font family was the most frequently cited style (Wu et al. 2020), consistent with recommendations for large-print documents by the American Council of the Blind (2011), which advocates the use of sans serif fonts such as Arial. Few participants mentioned fonts specifically designed for people with low vision, such as APHont or Tiresias (Wu et al. 2020). This aligned with earlier studies that did not find consistent benefits from specially designed or particular mainstream fonts (Legge 2007; Woods and Satgunam 2011; Xiong et al. 2018). However, some evidence suggests that fonts with increased spacing between letters, such as Courier, may be helpful (Pelli et al. 1985; Tarita-Nistor et al. 2013; Xiong et al. 2018). The low-vision sample in Wu et al. (2020) was not representative of the wider low-vision population, and further research is needed to determine whether expressed preferences correspond strongly with measurable aspects of reading performance, such as reading speed or critical print size.

2.2 Deaf and hard of hearing

2.2.1 Definition and context

While there is no legal definition of 'deaf', nor a universal definition of sign languages (Allen 2015), the term "hard of hearing" generally refers to individuals with mild to severe hearing loss, whereas individuals who are deaf typically have profound hearing loss (WHO 2021). In the literature, 'deaf' (with a lowercase d) is often used to refer to the physical condition of having profound or total hearing loss, whereas 'Deaf' (with an uppercase D) refers to people who are culturally *Deaf*, often use sign language as their first language, and identify with the Deaf community (Woodward and Horejes 2016). In the UK, approximately 2% of working-age adults and 11% of people of state pension age report having a hearing loss (Table 1) (Kirk-Wade et al. 2024). People who are hard-of-hearing usually communicate through spoken language and may benefit from hearing aids, cochlear implants, and other assistive devices, as well as captioning. Those who are deaf may also benefit from cochlear implants, and some use sign language as their primary means of communication (WHO 2021). While sign languages are the primary form of communication for a portion of the d/Deaf and hard of hearing community, communication preferences exist on a continuum, ranging from d/Deaf individuals who do not sign and rely solely on spoken language to those who are fluent sign language users with limited proficiency in the spoken language. These groups are particularly at risk of exclusion from participation in scientific research when data collection relies solely on the national spoken or written language (Irasiak et al. 2021) as evidence suggests they have lower reading ability compared to people who are not d/Deaf or hard-of-hearing (Hutchinson 2023; Worsfold et al. 2018).

2.2.2 Implications of hearing loss for survey participation

For many people who are hard-of-hearing or d/Deaf, sign language is their first or preferred language for communication, while spoken or written languages are often second languages with varying literacy levels (Lederberg et al. 2013; Napier et al. 2018). However, questionnaires are frequently administered in official written languages and rarely presented with accessibility features (Bernabé and Orero 2019) such as in sign language for people who are hard-of-hearing or d/Deaf. Written language differs from sign language in grammar and sentence structure and may present comprehension challenges for those whose first language is a sign language (Dostal et al. 2025; Rowley and Cormier 2024). As a result, hard-of-hearing or d/Deaf individuals, whether as researchers or research participants, are often under-represented due to issues arising from different communication modalities (signed, spoken, written) and the need for interpretation, transcription, and translation (McKee et al. 2011; Young and Temple 2014). Although more effective and less time-consuming computer-assisted (interviewer-led or self-completion) data collection techniques, such as computer-assisted web interviewing, have been developed (Irasiak et al. 2021), these approaches still tend to exclude people with lower literacy levels from participation, thereby raising concerns about sample representativeness. Young and Hunt (2011) argued that it would be incorrect to assume that participation in written surveys is not exclusionary simply because hearing ability is not required. In fact, hearing loss can negatively affect literacy levels (Lederberg et al. 2013). More recently, however, accessibility improvements through computerised video technologies have made it possible to incorporate sign languages into self-completion questionnaire design (Bosch-Baliarda et al. 2019). People with hearing impairments whose first or primary language is a sign language should have access to questionnaires in a format that enables them to complete them unassisted and autonomously (Irasiak et al. 2021).

2.2.3 Measures to include people with hearing loss in surveys

2.2.3.1 Experiences of d/Deaf and hard-of-hearing people with survey materials

The ONS also explored how people who are d/Deaf or hard-of-hearing experienced key survey touchpoints using materials from the TLFS. Semi-structured interviews were conducted with participants who were d/Deaf or hard-of-hearing and who either used British Sign Language (BSL), were technology users, or were low digital users (Davies and Giji 2024; Giji et al. 2024).

Participants generally provided positive feedback on the TLFS invitation letters. However, for those whose first language was BSL, the letters were often inaccessible because they were written in standard English structure (Davies and Giji 2024; Giji et al. 2024). Written English differs from BSL in grammar and sentence structure and may present comprehension challenges for those whose first language is BSL (Dostal et al. 2025; Rowley and Cormier 2024). Participants suggested that offering information in both BSL and English would improve accessibility. They also suggested that inclusion of a BSL logo on the letter would signal that the survey actively sought to engage people who are d/Deaf or hard-of-hearing. Feedback on the knock-to-nudge reminder approach was mixed. Some participants were receptive, provided they were informed in advance, while others raised safety concerns, reporting that unannounced visits from unknown individuals could feel pressurising and create a sense of vulnerability (Davies and Giji 2024; Giji et al. 2024).

Participants suggested that speaking to an interviewer would be their preferred mode of survey administration, as it would allow them to see the person's lips as well as their facial expressions. Nevertheless, participants reported that they found online completion easier and accessible as this mode did not rely on their hearing. However, online surveys still presented barriers for those whose first language was BSL as well as low digital users. For BSL users, written English remained a challenge, and participants expressed a preference for the option to complete the survey in BSL. Suggestions included embedding BSL translation videos alongside survey questions. For low digital users, the online mode was seen as a barrier, and some participants indicated a preference for interviewer-administered modes of data collection (Davies and Giji 2024; Giji et al. 2024).

2.2.3.2 Video display

In the US, the National Centre for Deaf Health Research (NCDHR) was established in 2004 to expand knowledge of d/Deaf population health. One of its initial projects was to develop and implement a linguistically and culturally accessible health risk behaviour survey, broadly based on established national health surveys (Graybill et al. 2010). Due to differences in grammar and sentence structure between written language and sign language which may present comprehension challenges in self-completion surveys, to ensure accessibility for the d/Deaf and hard-of-hearing community who use sign language, it was essential that survey questions and answer choices were delivered in American Sign Language (ASL). Because ASL is not a written language, surveys must be administered either through live interviews in ASL (e.g., Margellos-Anast et al. 2005; Margellos-Anast et al. 2006) or via some form of ASL video display (e.g., Fellinger et al. 2005; Gerich and Lehner 2006; Steinberg et al. 1998). The NCDHR chose a sign language video display and developed an interactive touch-screen computer interface capable of delivering the survey content and recording responses, but not as an online survey. Other objectives included translating the written English source material into ASL, recording the translations, editing and inserting the recorded clips into the computer interface,

recruiting d/Deaf and hard-of-hearing participants, and conducting the survey (Graybill et al. 2010). The screenshot below illustrates the interface and highlights several features, including the ability to switch between sign models, adjust the background colour behind the signer, modify text size, and other properties.

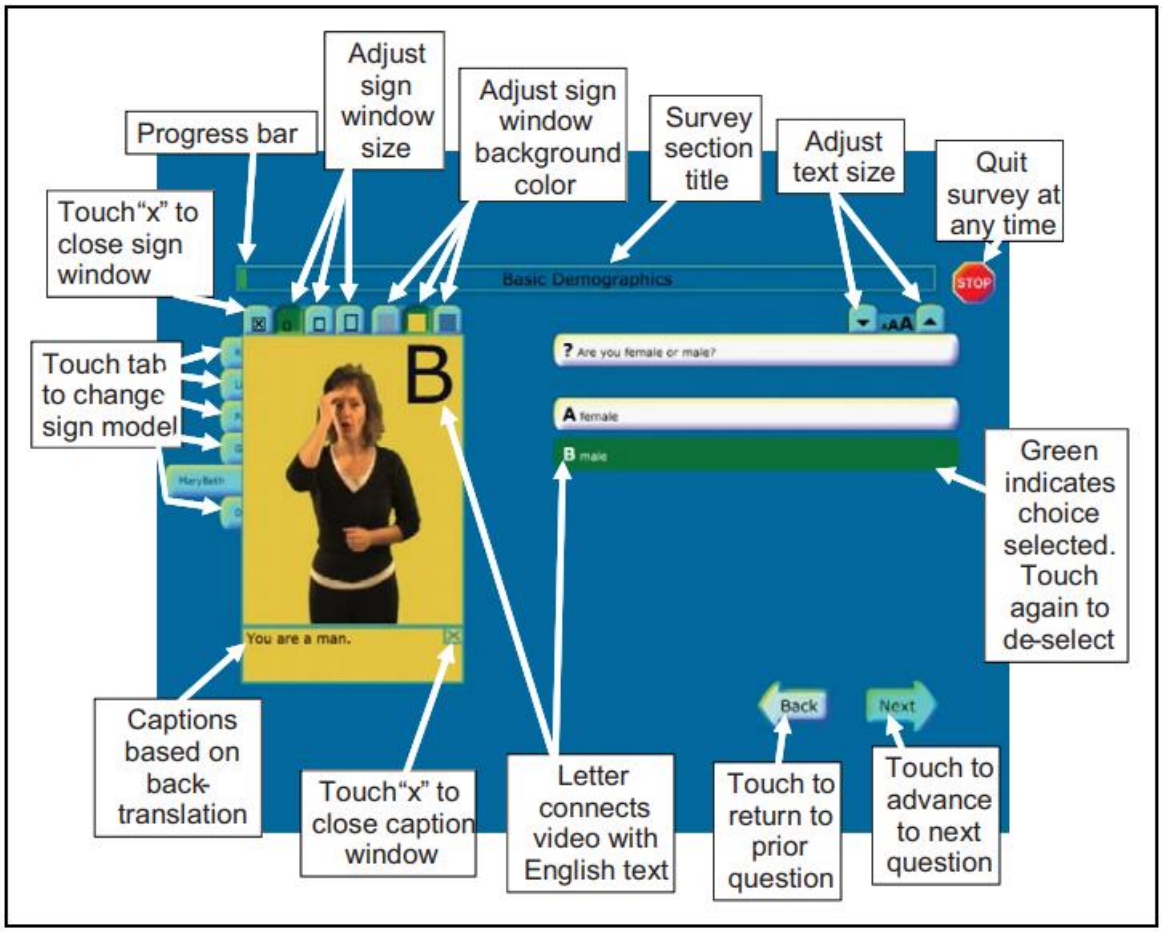

Figure 3. Screenshot and descriptions of deaf health survey interface

Source: Cited in Graybill et al. (2010:433)

As part of the study, a Translation Work Group (TWG) was formed to translate and adapt the written English source material into ASL and oversee the signing recordings to ensure that they followed the approved script (Graybill et al. 2010). Four different deaf individuals were filmed signing the completed scripts, allowing survey respondents to choose the signer they felt most comfortable watching, for example, on the basis of communication style, age, race, or gender. For survey reliability, consistency in how each signer followed the script was closely monitored. The TWG translated 81 questions, hundreds of corresponding response options, 14 dictionary items, and explanatory comments such as instructions navigating the questionnaire, requiring approximately 40 two-hour meetings. Additional time was spent creating the sign language script itself, including filming a deaf TWG member signing the final translations for the four signers to follow in the studio. Although the ASL script was strictly followed, each model's signing style remained distinct, providing respondents with multiple options. The survey interface allowed participants to switch between signers or view several models signing the same item, supporting comprehension, stylistic preferences, and item-specific factors such as the signer's age or gender (Graybill et al. 2010). The enhanced privacy

and flexible programming of computerised, self-administered surveys make them particularly effective for collecting sensitive data from specialised populations (De Leeuw et al. 2003).

However, the translation and adaptation process can present challenges. Some terms in the written English source questionnaire have no direct ASL equivalent, requiring longer explanations. For instance, there is no single sign for 'a drink' in the sense of any alcoholic beverage; the TWG therefore used several alcohol-related signs alongside commentary to convey the intent of 'a drink' in the source questionnaire (Graybill et al. 2010). Furthermore, respondents to a written survey can scan answer choices quickly and reread them in any order before making a final selection. In contrast, Deaf Health Survey participants could replay ASL answer choices as often as they wished, and in any order, but the initial presentation was necessarily sequential rather than near-simultaneous, as in a written survey. Consequently, respondents could not skim the answer choices; they had to watch and consider each one in turn before selecting or, if desired, replaying any of them (Graybill et al. 2010).

2.2.3.3 Signing avatar application

Irasiak et al. (2021) conducted a study in Poland to examine how a signing avatar application could be integrated into electronic questionnaire systems to support d/Deaf individuals who use Polish Sign Language (PSL) as their first language. The aim was to determine how effectively an avatar, a computer generated image resembling a human, could communicate PSL and to identify the design features that most enhance the clarity and comprehension of the signed content. Irasiak et al. (2021) first compared participants' comprehension of PSL messages presented by a human interpreter versus an avatar. Based on these findings, they developed a 3D avatar model with refined animations that incorporated elements shown to aid sign-language reception. In the final stage, they tested this enhanced version to evaluate improvements in participants' understanding of the signed questionnaire content.

Irasiak et al. (2021) designed their questionnaire to ensure both physical and sensory accessibility, providing it in written Polish and in PSL to minimise linguistic and cultural bias and to accommodate diverse communication needs. The questions and response options were written in plain language, which supported readability and comprehension while also facilitating accurate interpretation into sign language. Accessibility considerations extended beyond language to include the integration of sign-language videos, the logical structure of content, and the navigation features embedded within the questionnaire interface.

For navigation, Irasiak et al. (2021) emphasised the importance of simple and intuitive design features that can be used regardless of a respondent's technical skills or language abilities. Key features included displaying only one question per page and providing clearly visible 'next' and 'return' buttons to support movement through the questionnaire. A progress indicator showing the percentage of questions completed helped respondents orient themselves within the survey. Short, clear on-screen prompts were also used, for example, to indicate when a question must be answered to continue or whether one or multiple responses were permitted. Additional accessibility features allowed users to zoom in and out of the multimedia content and pause or replay the sign-language videos. Irasiak et al. (2021) further developed functionality to ensure content compatibility between PSL and written Polish. As each answer option was conveyed in PSL on the accompanying video clip, the corresponding written answer was highlighted on screen. This synchronisation was achieved using a subtitle file with time markers aligned to the questionnaire content, ensuring that the displayed text precisely matched the PSL presentation at all times. Irasiak et al. (2021) found that

respondents correctly answered more than 80% of the questions designed to assess their understanding of the avatar-delivered sign-language content and concluded that further monitoring of deaf respondents' satisfaction with deaf-friendly tool is justified in order to continue improving accessibility and user experience.

2.3 Motor control impairments

2.3.1 Definition and context

People with motor control impairments experience difficulties that affect their ability to move, manipulate objects, and interact with the physical environment (Sarsenbayeva et al. 2022), which can have a substantial impact their activities of daily living. Motor control impairments include conditions such as cerebral palsy, spinal cord injury, Parkinson's disease, multiple sclerosis, muscular dystrophy, and post-stroke hemiparesis, among others (Sarsenbayeva et al. 2022). These impairments may make it difficult to execute tasks that are fundamental to interacting with computers, such as clicking, pointing, and dragging, as well as using devices that require fine manipulation, such as small keyboards (Sarsenbayeva et al. 2022; World Health Organisation 2011). Alternative access methods, including switch interfaces, adapted keyboards, and head or eye tracking technologies, can support computer use (World Health Organisation 2011). In 2011, the World Health Organisation (WHO) (2011) estimated that approximately 15% of the global population had a motor control impairment. In the UK, data from the 2022/23 FRS indicated that around 5% of working-age adults and 15% of people of state pension age reported experiencing a motor control impairment (Table 1) (Kirk-Wade et al. 2024).

2.3.2 Implications of motor control impairments for survey participation

Motor control impairments have a substantial impact on people's activities of daily living, which may influence their ability to participate in surveys, particularly self-completion surveys. Individuals with motor control impairments are more likely to rely on computers, as digital tools provide essential support for personal and professional communication, environmental control, assisted mobility, and access to services (Abascal and Nicolle 2005). However, difficulties executing fundamental tasks required for computer interaction due to motor impairments (Sarsenbayeva et al. 2022; World Health Organisation 2011) can make participation in surveys, particularly web surveys, challenging. In addition, many conditions classified under motor control impairment are associated with symptoms such as fatigue, reduced motor speed, and diminished performance (Price and Sears 2009), which may further hinder survey participation.

2.3.3 Measures to include people with motor control impairments in surveys

There is limited literature on measures to support the participation of people with motor control impairments in surveys. However, Sarsenbayeva et al. (2022) conducted a systematic literature review on studies aiming to enhance the accessibility of technology for people with motor control impairments. Considering device use, Sarsenbayeva et al. (2022) found that while previously the focus was on building accessible solutions for desktop computers, including desktops using an eye-tracker, the growing popularity of mobile devices has led to a shift towards developing accessible interfaces for smartphones and tablets. Therefore, development of accessible solutions should reflect the device use. One of the main barriers to conducting accessibility research and designing accessible technology was the recruitment

of people with motor control impairments to evaluate a new design or piece of technology (Mankoff et al. 2010). While larger samples may improve representation, they still may not fully capture the diversity of the population, given the substantial heterogeneity in the characteristics and needs of people with motor control impairments (Mankoff et al. 2010).

Another of the key challenge in designing accessible technology is its cost inefficiency. This occurs largely because most technological solutions are developed for able-bodied users (Glinert and York 2008). Designing technology for people with permanent motor control impairments requires multiple levels of customisation and the use of specialised design tools (Steriadis and Constantinou 2003). Research has also shown that many individuals with permanent motor control impairments prefer mainstream technology over specialised devices due to factors such as social acceptance and cost (Kane et al. 2009; Profita et al. 2016; Shinohara and Wobbrock 2011). Higher costs associated with accessible technology may contribute to discrimination and social isolation if individuals are unable to afford the required devices (Abascal and Nicolle 2005). However, Newell and Gregor (1999) argued that information technology does not have to be expensive if accessibility is embedded early in the design process. Similarly, Sarsenbayeva et al. (2022) suggested that incorporating accessibility considerations from the outset is more effective than attempting to add accessibility features once a product is already complete.

Finally, it is important to recognise that participation in studies and completion of study tasks can lead to fatigue for users of all abilities, with a more pronounced impact on individuals with permanent motor control impairments (Price and Sears 2009). People with motor control impairments often face difficulties using standard multi-dimensional input devices, such as a keyboard or mouse (Steriadis and Constantinou 2003). Text entry can be particularly challenging on both stationary technologies such as desktop computers and mobile technologies such as smartphones (Wobbrock 2006). Successful text entry requires physical stability, tactility, accuracy, and fine motor control, which may be compromised for these users (Wobbrock 2006). Therefore, when designing for people with disabilities, technology should be developed to leverage their strengths and functional capabilities (Liu et al. 2016). It is essential to avoid a one-size-fits-all approach to accessibility (Alabi and Gooch 2011). Instead, accessible technology should incorporate personalisation so that individual needs and abilities are understood and translated into tailored design adaptations (Gajos et al. 2012).

2.4 Mental health and neurodevelopmental conditions

2.4.1 Definition and context

Mental health can be understood as the successful performance of mental function, with poor mental health characterised by the presence of psychological distress (Kessler et al. 2002; Satcher 2000). Mental health conditions in the general population can range from common mental health conditions (CMHCs) through to rarer mental health disorders which are more severe and specific conditions (Perales and Baffour 2018), “characterised by alterations in thinking, mood, or behaviour […] associated with distress and/or impaired functioning” (Satcher 2000, p.7), and neurodevelopmental conditions such as attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) (Ridout et al. 2025). CMHCs cause marked emotional distress and interfere with daily function, but do not usually affect insight or cognition and comprise different types of depressive and anxiety disorders, such as depression, generalised anxiety disorder (GAD), panic disorder, phobias, obsessive

compulsive disorder (OCD). These are usually less disabling than major psychiatric disorders (Liubertiene et al. 2025). Based on the 2022/23 FRS, approximately 12% of working-age adults and 5% of people of state pension age in the UK reported experiencing a mental health issue (Table 1) (Kirk-Wade et al. 2024). In the context of this review, we are interested in how neurodevelopmental and mental health conditions impact survey participation, the representativeness of individuals with these conditions in the general population, and ways in which their participation can be improved.

2.4.2 Implications of mental health and neurodevelopmental conditions for survey participation

Individuals with poor mental health or mental health disorders face additional barriers when engaging in the survey interview process compared to those without such conditions. These challenges can be attributed to symptoms associated with the conditions, which may affect motivation and interest, as well as reduce cognitive capacity for processing survey questions (Perales and Baffour 2018). Perspectives on information processing theory in survey methodology suggest that when respondents are presented with a question, they engage in a series of mental processes before formulating a response (Schwarz 2007). An influential approach by Tourangeau, Rips and Rasinski (2000) consists of a four-phase model[2] of survey response:

> *Phase 1*: Comprehension – how the respondent understands the request.
>
> *Phase 2*: Retrieval – recalling information necessary to provide a response.
>
> *Phase 3*: Judgement – deciding what information will be shared.
>
> *Phase 4*: Response – formulating the response.
>
> (Perales and Baffour 2018; Tourangeau et al. 2000).

Symptoms experienced by individuals with poor mental health or mental health and neurodevelopmental conditions can affect the survey response process, potentially leading to suboptimal survey interview outcomes (Perales and Baffour 2018). For example, poor mental health can reduce interest and motivation to participate in survey interviews, affecting both the judgment phase of the four-phase response model and other stages. Respondents may choose not to share certain information, pay less attention to questions, struggle to retrieve relevant details, or provide incomplete answers.

2.4.3 Measures to include people with mental health and neurodevelopmental conditions

2.4.3.1 Mental health

Experiences of people with CMHCs participating in surveys: The ONS conducted focus groups to examine how poor mental health may affect participation in social surveys. Participants were recruited through charities supporting people living with mental health conditions using purposive sampling and included individuals living with at least one CMHC (Davies and Giji 2024; Robinson et al. 2024b).

[2] Subsequent work has extended this approach to the ESCRIME model (encoding, storage, comprehension, retrieval, integration, mapping, and editing). *Encoding* and *storage* refer to taking in and interpreting experiences and then *storing* them in long-term memory. *Mapping* refers to translating an underlying judgement onto one of the available response options. *Editing* refers to modifying one's answer before reporting it (Tourangeau 2018:169).

Findings from the focus groups suggested that postal invitations evoked anxiety, particularly among those with OCD who feared touching delivered mail, and among those who associated official-looking letters with previous negative experiences. Despite this, some participants reported that the official appearance of the letters prompted them to open the letter. On the other hand, repetition of information across communications was described as stressful, and participants felt pressured to review earlier materials to ensure they had not missed any instructions. The knock-to-nudge approach as a reminder was also viewed negatively, and participants described unannounced visits from fieldworkers as anxiety-provoking and potentially distressing (Davies and Giji 2024; Robinson et al. 2024b).

However, participants reported that being invited to take part in a survey could positively affect their mental health, as it fostered a sense of inclusion and provided an opportunity to contribute and share experiences. The survey topic and the offering of incentives also influenced participation decisions. The mode of completion affected people living with mental health conditions differently. Some viewed the online mode as inaccessible, frustrating, or impersonal, while others reported that its flexibility reduced pressure, and completing the survey online could provide a sense of achievement (Davies and Giji 2024; Robinson et al. 2024b).

Easy to read materials: The Care Quality Commission (CQC) commissioned the Community Mental Health Survey, a survey for service users about their recent experiences of NHS community mental health services (Survey Coordination Centre 2025). Since 2023, the survey has employed a push-to-web design, offering both online and paper completion options. Sampled individuals received an invitation letter, followed by a text message reminder containing a survey link for those with a registered mobile number. Further reminder letters and text messages were issued only to non-respondents to encourage participation, with a paper questionnaire and freepost return envelope included in the third letter. The survey's methodological design incorporated accessibility considerations to support participation across diverse user groups (Survey Coordination Centre 2025). The online survey was accessible in nine languages in addition to English and was designed to be device-agnostic: thus, it automatically adapting to different devices such as mobile phones, tablets, and desktop computers. Participants could access the survey either by selecting the link included in the text message reminders or by logging in using the credentials provided in their invitation letter. Accessibility features included compatibility with screen-reading software and the ability for respondents to adjust the display settings. Users could also select from three font sizes and five background colour options (white, beige, blue, green, and grey) to support readability. For the paper questionnaire, alternative formats were available, including braille, large print, and easy read versions (Survey Coordination Centre 2025).

The Disability Unit and Cabinet Office (2021) provided some guidance of accessible communication formats for people with learning disabilities, including easy read materials. Easy read materials include images to support the meaning of text. Although designed for people with learning disabilities, easy read formats can also benefit individuals without such disabilities by presenting essential information with reduced linguistic complexity. It is particularly useful for those who are not fluent in English. However, producing easy read materials can be resource intensive (Disability Unit and Cabinet Office 2021). According to the Disability Unit and Cabinet Office (2021), best practice for easy read formats includes using short sentences, avoiding complex terminology wherever possible, and explaining difficult words in a separate sentence if they must be used. A minimum font size of 14 point is also

recommended to maximise readability. This was also supported by the Government Analysis Function (2024), which reported that the average reading age in the UK was approximately nine years old. To ensure inclusivity, written materials should therefore be designed and tested to meet this reading level. In particular, plain English should be used, with simple vocabulary that avoids vague or overly technical terminology, as well as regionally specific expressions. Furthermore, sentences should be concise, ideally containing no more than 25 words (Government Analysis Function 2024).

Audio computer-assisted self-interviewing: Other surveys of psychiatric morbidity of the general population, such as Adult Psychiatric Morbidity Survey (Liubertiene et al 2025), tend to use interviewer-administered modes for data collection. However, Epstein et al. (2001) conducted an experimental study to assess the impact of audio computer-assisted self-interviewing (ACASI) administration on the reporting of mental health syndromes in a general population survey. The ACASI methodology enables respondents to listen to survey questions through a headset and/or read them on a computer screen, and to directly enter their responses using the computer interface. Compared with self-completion paper questionnaires, ACASI can incorporate more complex routing, as skip logic can be automatically programmed based on previous responses. Additionally, relative to interviewer-administered modes, ACASI has been shown to increase disclosure of sensitive behaviours by providing greater privacy during the response process. As a result, the ACASI approach may help reduce response burden when reporting mental health symptoms and enhance data quality by supporting more accurate and complete reporting. While ACASI offers several advantages, its effectiveness can be limited if respondents are unwilling or unable to interact directly with the computer (Epstein et al. 2001).

In their experiment, Epstein et al. (2001) aimed to compare the prevalence of estimates obtained from a mental health module administered using an interviewer-led paper questionnaire (I-PAPI) and those from an ACASI version of the same module in a U.S. general population sample of adults aged 18 or older. The experiment was embedded within the National Household Survey on Drug Abuse (NHSDA). The study focused on four mental health syndromes: major depressive episode, generalized anxiety disorder, panic attack, and agoraphobia. Their findings indicated that respondents reported more mental health symptoms when completing the ACASI version than when responding to the I-PAPI version. These results supported the use of ACASI in general population mental health surveys to improve disclosure and data quality (Epstein et al. 2001).

Proxy responses: It is not uncommon in survey practice to ask a proxy respondent to provide information about a sampled individual who cannot participate due to physical or mental illness, limited language ability or unavailability during fieldwork (McManus and Brugha 2025). The sampled individual may not be able to take part in the survey but may be able to indicate whether someone else can respond on their behalf. However, the use of proxy respondents has important implications. There may be uncertainty regarding whether the sampled individual would consent to the disclosure of information or whether their own responses would differ from those provided by the proxy. Moreover, proxy respondents should only be asked factual questions about observable actions or circumstances (McManus and Brugha 2025).

2.4.3.2 Neurodivergence

In addition to focus groups with people living with CMHCs, the ONS conducted semi-structured interviews to examine how neurodivergent people, including those with ADHD, dyslexia and autism, experienced key survey touchpoints using TLFS materials. Findings suggested that participants valued prenotifications because they allowed time to process information and prepare for participation. The official appearance of the envelope for the invitation letter encouraged opening of the letter, as it signalled importance. However, the brown coloured envelope evoked negative feelings among some participants, such as tax, benefits, or fines, while the strapline on the envelope ('play your part…') helped convey a message the envelope contained something interesting. Participants with autism and dyslexia found the large-print version (four pages) less overwhelming than the standard one-page letter, while the visual presentation of the text drew participants' attention and supported comprehension. However, where some participants interpreted visual elements literally, they were unsure of their meaning. Participants with ADHD found the letters less engaging and suggested that varying background colours across sections could better capture attention (Davies and Giji 2024; Zimmermann et al. 2024).

While reminder letters were generally viewed positively as physical prompts, for participants with reading difficulties, they added cognitive burden. On the other hand, the knock-to-nudge approach was viewed negatively, particularly among those with social and communication difficulties, and some participants reported they would be unlikely to answer the door. Participants reported that they appreciated the vouchers and those with autism and ADHD found being able to redeem these online easier, while dyslexic participants reported difficulties with setting up or registering with stores online and entering the code (Davies and Giji 2024; Zimmermann et al. 2024).

Participants valued completing the survey online because it avoided social interaction and allowed them to proceed at their own pace. However, self-completion could also create cognitive burden, with some participants lacking confidence in completing the survey independently. Transferring a web address and access code from paper to a digital device was considered burdensome, and participants preferred QR code access. Participants with ADHD and dyslexia reported difficulty maintaining focus, while those with autism described feeling overwhelmed by the volume of information. Participants suggested completing the survey in sections and being able to save progress (Davies and Giji 2024; Zimmermann et al. 2024).

3 Literacy and language limitations

Developments in technology and society increasingly demand that individuals are self-reliant, proactive, and adept at problem-solving. However, significant segments of the population lack these essential competencies (Cremers et al. 2017). This is particularly true among adults with low literacy, who are often excluded from full social participation due to insufficient skills in reading, writing, and numeracy. The causes of low literacy are multi-faceted, stemming from a combination of socio-demographic, educational, individual, and familial factors. It can also be exacerbated by language barriers, which hinder effective communication, especially in a non-native language. Furthermore, low literacy is frequently associated with technology access limitations, including difficulties in operating devices, understanding technical instructions, and using information and communication technologies. Together, these three barriers (i.e., low literacy, language barriers, and digital exclusion) directly impede the ability of these population sub-groups to participate in social survey research. This section examines

the specific challenges these limitations pose for survey participation and reviews relevant literature on measures designed to mitigate them.

3.1 Literacy

3.1.1 Definition and context

Literacy can be defined as "*the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with various contexts*. *Literacy involves a continuum of learning in enabling individuals to achieve his or her goals, develop his or her knowledge and potential, and participate fully in community and wider society"* (UNESCO 2005, p. 21). This definition goes far beyond the traditional idea of literacy being simply the ability to read and write text, and involves a plural and multiple concepts, shaped by contextual factors (Robinson 2023).

Literacy is usually conceptualised in levels. For example, the Organisation for Economic Co-operation and Development (OECD) defines literacy across six levels, with individuals with Level 1 or below literacy skills considered to have "poor" literacy skills. At Level 1, individuals can understand short texts and organised lists when information is clearly indicated, find specific information and identify relevant links. Those below Level 1 can at most understand short, simple sentences (OECD 2024). Level 3 is considered the minimum literacy skills for coping with everyday life, i.e. reading long and complex texts, make inferences, and understand information that is not explicitly stated. The latest cross-national Survey of Adult Skills, known as PIAAC (Programme for the International Assessment of Adult Competencies), conducted in OECD member countries was published in 2024. The survey found that 18% of adults in England had low proficiency in literacy, or literacy levels at or below Level 1 (with 6% of UK adults below Level 1)[3]. This compares with 16.4% who had low proficiency when the previous report was published in 2015 (OECD 2024).

3.1.2 Implications of low literacy for survey participation

Illiteracy or low literacy can have serious implications for social survey research. Guidance from the Government Analysis Function (2024) suggests to survey researchers that "*choosing the right tone for […] survey products is important and should be established through research*", further highlighting that "*inappropriate language and tone can have adverse effects such as reduced response rates, lack of inclusivity and lack of compliance with Government Digital Service standards*"[4].

Studies have demonstrated that individuals with lower levels of education are under-represented in social surveys (e.g., Helmschrott and Martin 2014; Blom et al. 2016; Christmann et al. 2024; Cornesse and Schaurer 2021). This education bias appears to be more pronounced in self-administered modes than in face-to-face interviews (Luijkx et al. 2021;

[3] *Level 1* of literacy is defined as "*Adults can read relatively short digital or print texts to locate a single piece of information that is identical to or synonymous with the information given in the question. Knowledge and skill in recognising basic vocabulary, determining the meaning of sentences, and reading short paragraphs of text is expected*". *Below Level 1* implies "*Adults can read brief texts on familiar topics and locate a single piece of specific information. Only basic vocabulary knowledge is required and the adult is not required to understand the structure of sentences or paragraphs*" (OECD, 2024).

[4] https://analysisfunction.civilservice.gov.uk/policy-store/inclusivity-and-accessibility-in-survey-development/

Stein et al. 2025). Even when selected to participate, those with lower education levels are more likely to refuse participation, fail to return paper questionnaires, or drop out of longitudinal panels (Durrant et al. 2010; Sjetne et al. 2019; Luijkx et al. 2021). The inherent requirement for a certain level of reading and writing ability in self-completion surveys necessarily makes individuals with low literacy less likely to respond (Lynn 2024).

Furthermore, even if they engage in participation, these respondents often face greater difficulty understanding the questions. Vague or ambiguous questions are generally prone to idiosyncratic interpretation, which increases measurement error (Lenzner 2012). Problematic text features include low-frequency words, vague or imprecise relative terms, vague or ambiguous noun phrases, complex syntax, complex logical structures, low syntactic redundancy, and the need for bridging inferences (Graesser 2006; Lenzner, Kaczmirek, and Galesic 2011). These comprehension issues are likely to be significantly worse for individuals with lower literacy levels[5].

Furthermore, there is a consequent risk that these issues could lead participants (especially those with lower literacy levels) to misinterpret questions and provide answers that do not reflect their true opinions, perceptions, or behaviour. Survey data quality problems like acquiescence bias, satisficing, and straightlining are generally associated with lower literacy levels (Kim et al. 2019; Reuning and Plutzer 2020; Zhang and Conrad 2014). Furthermore, participants with lower literacy typically exhibit higher item non-response levels in open-ended questions (Scholz and Zuell 2012).

Finally, there are ethical implications to consider, as participants may not fully understand the research purpose, the intended use of their data, their right to withdraw, or any potential risks, even after signing the participation consent form (Foe and Larson 2016). This is particularly critical when the survey seeks consent for activities beyond the questionnaire itself, including participation in further studies or administrative data linkage (Das and Couper 2014; Sakshaug et al. 2021). There is a risk that individuals may feel pressured to participate without fully understanding the study implications, potentially undermining the ethical principles of voluntary participation.

3.1.3 Measures to include groups with low literacy

Many of the issues discussed in the previous section are more strongly associated with self-completion surveys. In contrast, illiteracy poses less of a challenge in interviewer-administered surveys, as interviewers can assist respondents in understanding the questions and facilitating their responses.

Several measures can be implemented to ensure groups with low literacy are included in self-completion surveys. Alternatives to conventional text-based survey questionnaires, such as audio, picture, or video support, have been used in limited instances, and especially in face-to-face settings, are reviewed in Section 3.1.3.1. Other strategies include incorporating interviewer-assisted modes within mixed-mode design (Section 3.1.3.2) and simplifying survey language in self-administered surveys (Section 3.1.3.3).

[5] These problems may be exacerbated for individuals who are not fluent in the survey's language, as discussed in the next section.

3.1.3.1 Audio, picture, and video support

There is limited evidence on the implementation of audio, pictures, or video support, in self-administered surveys. Most implementations in this area stem from health research and focus on participants with low health literacy; that is, those who have difficulty seeking, understanding, and using health information. Examples include an interactive health assessment questionnaire used in physical therapy (Cremers et al. 2017), and a patient-reported outcome measure questionnaire for hand and upper extremity patients (Azad et al. 2024). Although not directly related to social survey research, these applications are noteworthy for their use of interactive features. These include animations, illustrated scales, touch screens, icons, and read-aloud versions, all of which helped participants to better understand the questions and provide higher quality information.

Similarly, computer-assisted self-interviewing has been adapted with integrated audio to better engage respondents with lower literacy. This audio support can be implemented in two primary ways. The first is as a supplemental aid, where an audio recording of the question plays alongside the text displayed on the screen to assist comprehension. The second is ACASI which, as discussed in Section 2.4.3,, prioritises the audio component. In a typical ACASI setup, respondents listen to pre-recorded questions through headphones and enter their responses directly on a touch-screen device. The text of the question may not always be displayed (Heinritz, Will, and Gentile 2022).

Methods incorporating audio support have proved valuable in research involving populations where lower literacy is more prevalent, such as in rural areas of Africa (Hewett, Erulkar, and Mensch 2004; van de Wijgert et al. 2000), non-English speaking rural communities in the United States (Hofmann et al. 2010), and refugee populations in Germany (Jacobsen 2018). The evidence in these studies demonstrates that, despite potentially challenging interview conditions, participants can complete these surveys with minimal assistance from researchers. Although ACASI has been employed in large-scale, probability-based surveys in the US, including the National Household Survey on Drug Abuse (Lessler et al. 2000), the National Survey of Family Growth (Lindberg and Scott 2018), and the National Health Interview Survey (Dahlhamer, Galinsky, and Joestl 2019), its application has been mostly limited to the collection of sensitive information during face-to-face interviews.

3.1.3.2 Mixed-mode designs: The role of interviewers

Mixed-mode designs not only increase response rates and reduce administrative costs but have also been shown to improve coverage and reduce non-response errors (de Leeuw, Suzer-Gurtekin, and Hox 2018). Crucially, incorporating interviewer-led modes within a mixed-mode design can substantially reduce literacy and cognitive demands. Interviewers can read questions aloud, clarify misunderstandings in real time, and record answers (Groves et al. 2009). They can also improve participant motivation, reduce perceived difficulties, and mitigate the effects of the digital divide, which disproportionately affects less educated groups[6].

A recent review of surveys without field interviewers in the UK (Domarchi et al. 2025) found that 88% of survey instances offered more than one mode of data collection to respondents. However, only 34% of them offered an interviewer-led alternative, with telephone interviewing being the most frequently provided option. While offering interviewer-led modes

[6] See discussion in Chapter 4.

in cross-sectional surveys is often difficult, because it is generally not possible to target recruitment efforts towards lower-literacy groups using unnamed sampling frames, it can be particularly effective in longitudinal settings. In these studies, data from earlier waves can inform the fieldwork protocol for subsequent waves, allowing for targeted support (Kaminska and Lynn 2017; Roberts and Voorpostel 2023).

Interviewers play a key role in engaging participants with lower literacy levels by clearly explaining the purpose and procedures of a survey. A literature review on participation forms in medical studies found that while developing forms at an accessible reading level is attainable, it is not common practice (Foe and Larson 2016). The review also found that the risks of participation are the most poorly understood section. This highlights the critical role of interviewers in facilitating comprehension.

Supported survey completion (also known as interviewer-assisted completion) could also represent an effective measure of including participants with lower literacy levels in surveys. In this method, sample members can request an interviewer to assist them in responding to their questionnaire. This method has been used in the Transformed Labour Force Survey since October 2025 with the aim of improving response rates among harder-to-reach groups and is expected to ensure that less confident respondents can still participate (Office for National Statistics 2021b). Supported completion is also currently in consideration for the next round of the European Social Survey and the 2031 Census for England and Wales.

Research indicates that the methods and language used to convey information, along with the time dedicated to the participant, are key factors influencing informed consent in low-literacy sub-groups, sometimes even more so than literacy level itself (e.g., Bukini et al. 2020). In response, some studies have experimented with video-based consent to facilitate inclusion. Results showed no significant difference in comprehension or participation rates between those who received information via video and those who received it in person (Synnot et al. 2014; Quevedo et al. 2018). While these studies are limited to health research, the findings suggest video could be an effective method for ensuring understanding and upholding ethical standards in research involving low-literacy population sub-groups.

3.1.3.3 Language simplifications

Guidelines by the UK Government Analysis Function, based on the responded centred design approach (Wilson and Dickinson 2022), recommend that all survey content (including letters, communication materials, and the questionnaire itself) "*should be tested for reading age compliance*", using software like the Hemingway app[7]. In the UK, the average reading age is nine years old, and the official recommendation is therefore that content should be developed to meet this level (Government Analysis Function 2020a).

To improve data quality, a key principle of survey questionnaire design is to use simple language and avoid ambiguous or vague concepts. This is particularly important for improving the survey experience of less literate respondents (e.g., Bauer, Kunz, and Gummer 2025). In The Government Analysis Function suggests that survey contents should use plain English; simple vocabulary, avoiding vague and complex terminology; short sentences with 25 words maximum; and avoid abbreviations, colloquialisms, and words used in specific geographical regions (Government Analysis Function 2024).

[7] https://hemingwayapp.com/

United Nations (2025) similarly recommends that all materials should be available in easy read, as described previously in Section 2.4.3.1, as they can also be helpful for groups with lower literacy levels. Specifically, the guidelines recommend using short, clear sentences with one piece of information in each sentence; including clear instructions, facts, and statements; avoiding jargon, acronyms, abbreviations, and contractions; limiting detailed background information; and ensuring consistency with words and terminology. Although easy read formats were originally devised for making written information easier to understand for people with intellectual disabilities, these measures can also be helpful for individuals with lower literacy, or even non-native language users (as described in Section 3.2).

These same principles should extend to all recruitment communications, such as letters and related materials. Ensuring that these requirements are met in the final questionnaire relies heavily on the design stage, including conventional pretests and cognitive interviewing.

3.2 Cultural and linguistic minorities

3.2.1 Definition and context

Cultural and linguistic minorities, understood as the minority groups with a non-dominant position in the cultural and/or linguistical fabric of society, include immigrant populations, native or indigenous populations, small culturally distinct peoples living within the borders of a state with a different majority culture and language, and/or tribal or ethnic groups in culturally and linguistically diverse countries (Harkness et al. 2014).

Survey research is generally committed to including cultural and linguistic minorities to uphold both data integrity and the principles of inclusivity. However, these groups remain at high risk of exclusion. Standard probability-based surveys often under-represent cultural and linguistic minorities due to challenges in recruitment including the absence of reliable sampling frames, frequent changes of residence, and the concealment of migrant status (Bengochea, Fernández, and Montiel 2025). In addition, response rates, which are generally declining overall, are typically even lower for these minorities, creating significant problems for sample size and representativeness (Erens 2013). Even when contacted, individuals without the ability to speak (or read) the language in which the survey questionnaire and materials are written, are usually unable to understand the implications of their participation or provide consent without additional support. Finally, those who do respond may be more reluctant to share information on topics they perceive as sensitive due to cultural differences (e.g., opinions on potentially controversial subjects such as attitudes towards migration, political trust, or political preferences), or fear of repercussions (e.g., legal status, employment situation) (Erens 2013). The issue of distrust in research has recently been highlighted in qualitative research conducted in the UK, which identified a "*lack of trust outside (their own) ethnic group or community*" as a significant barrier to participation in face-to-face surveys (Bennett 2024). However, this distrust is not limited to that specific mode of administration and can also affect self-administered modes, especially for controversial or sensitive topics. All these factors can lead to higher levels of item non-response and a loss of data quality.

Ensuring participation of cultural and linguistic minorities is crucial and requires both a survey design aiming at recruiting them and facilitating their participation by adapting and translating communication materials and survey questionnaires. As with other dimensions in this evidence review, there is a clear trade-off between maximising survey quality (in terms of representativeness, coverage, response rates, and inclusivity) and survey cost. The following

sections further explore these issues and review the measures taken in social survey research and practice to overcome them.

3.2.2 Adaptation and translation of survey materials

3.2.2.1 General considerations

Some individuals from cultural and linguistic minorities often struggle to participate in surveys if they do not speak or understand the language in which the materials are written. Offering translations into respondents' preferred languages can improve participation among these groups, thereby reducing non-response bias and improving sample representativeness. (Manuel et al. 2025). However, translation is a complex and expensive task.

In social research, a high-quality translation must (a) accurately reproduce the source text, (b) use the natural forms of the target language, and (c) express all aspects of the meaning in a way that is easily understood by respondents (Lopez et al. 2008). Achieving these objectives requires professional translators, which can be costly for self-administered surveys, and is often unfeasible for interviewer-led modes, as the latter would require the recruitment and training of multilingual interviewers.

Furthermore, for research conducted in a single country, the proportion of the target population requiring translated materials is often low[8]. For example, according to the 2021 Census (Office for National Statistics 2021a), 98.8% of usual residents of England and Wales, aged three years and over, can speak English (English or Welsh in Wales), while the figure is 98.6% for Scotland (National Records of Scotland 2022). This, combined with the lower response rates typically observed among these minority groups, often result in a low uptake of translated questionnaires, as outlined in the examples provided in Section 3.2.2.3. This can make the substantial investment in professional translation an arguably inefficient use of limited research resources.

Unfortunately, most of the evidence in the literature focuses on how to conduct high quality survey translations, rather than on when such translations are justified. In practice, organisations frequently make this decision by assessing the share of the population speaking languages other than the national or dominant language(s), considering their geographic distribution, and consulting local partners about languages that may be important for sub-groups of interest such as ethnic or religious minorities (Salazar *et al.*, 2022). However, beyond the inclusivity perspective, survey translations are arguably more justifiable when the potentially excluded sub-groups are expected to respond differently on the survey's *substantive* variables of interest (Manuel *et al*, 2025); and when the translation costs can be amortised (for example, for surveys expected to be repeated over time) or shared across survey projects that might benefit from the translated questionnaires or materials (Manuel *et al.*, 2025). Nonetheless, we found no evidence in the literature of any framework that determines when survey translation becomes economically or scientifically justified.

3.2.2.2 Best practices for translation

Providing good quality versions of survey materials is crucial not only for increasing participation among cultural and linguistic minorities, but also for ensuring respondents

[8] This is only true for translations for minority groups in the context of survey research in a single country (the focus of this section). Translations are essential for cross-national surveys, as questionnaire consistency is key for collecting equivalent data across countries (Behr 2018).

understand the questions, and for improving overall data quality (Harkness, Pennell, and Schoua-Glusberg 2004). Research shows that individuals with low proficiency in the language in which the survey was written tend to exhibit higher rates of item non-response, and worse scores on data quality indicators such as item non-response and straightlining (Kleiner, Lipps, and Ferrez 2015; Cornesse et al. 2020; Jacobsen 2022). Low quality translations severely compromise comprehension and can result in respondents not being asked what the researchers intended to ask. Shortcuts, such as using unedited web-based translations can significantly exacerbate these data quality issues (Harkness et al. 2004).

Current best practice guidelines for translation advocate for the TRAPD (Translation, Review, Adjudication, Pre-testing, and Documentation) model (Harkness 2003), a form of "team translation" originally developed for the European Social Survey (Behr 2018). The TRAPD model consists of the following stages:

1. Translation (T): Two skilled translators produce independent parallel translations.
2. Review (R): The translators meet with survey and subject-matter experts to reconcile their versions into a single reviewed draft.
3. Adjudication (A): An adjudicator signs off on the reviewed translation. In practice, review and adjudication may occur simultaneously.
4. Pretesting (P): The translated questionnaire is tested qualitatively and/or quantitatively to assess respondent comprehension, interview flow, and potential data quality issues.
5. Documentation (D): The entire process is documented, including staff profiles, procedures, challenges, key decisions, and adaptations (Behr and Zabal 2020).

While the original TRAPD model referred to "skilled practitioners", the latest *ITC Guidelines for Translating and Adapting Tests* (International Test Commission 2017) define a translation "expert" as an individual or team with combined knowledge of (1) the languages involved, (2) the cultures, (3) the content of the test, and (4) general testing principles. As highlighted by Behr (2018), translating these requirements to survey research means translators must familiarise themselves with the subject matter to understand the rationale behind question wording. They must also navigate the inherent tension between linguistic fluency and cross-cultural comparability, recognizing how translation errors can impact data integrity. Simultaneously, survey researchers must familiarise themselves with the fundamental theories and benchmarks of translation studies to effectively collaborate with translators and uphold data quality standards.

3.2.2.3 Applications in UK survey practice

As reported in a review of current UK survey practice (Domarchi et al. 2025), several self-administered surveys in the UK use translated versions of their questionnaires and materials. Surveys conducted by the Office for National Statistics (ONS) provide communication materials in Welsh for addresses in Wales. The TLFS, a self-completion survey conducted by ONS, also provides a Welsh language version of the questionnaire. This is part of the UK Statistics Authority's Welsh Language Scheme (UK Statistics Authority 2023), based on the Welsh Language Act 1993, which states: "*We will send out bilingual advance letters to prospective interviewees in Wales inviting them to let us know whether they wish for the interview to be carried out in English or Welsh. Forms and questionnaires for self-completion surveys will also be available bilingually. Any correspondence with interviewees in Wales, including letters, emails and text messages, will be sent in Welsh and English, unless the*

individual has specified in which language they would prefer (…)". Dedicated telephone helplines and language online help facilities are also available for addresses in Wales. As a reference, 1.7% of Welsh addresses returned their response to the 2021 Census for England and Wales using the Welsh language version of the questionnaire.

Other surveys have addressed the needs of cultural and linguistic minorities by implementing translation services. For example, both the Health and Care Experience Survey in Scotland (NHS Scotland 2024) and the Scottish Health Survey (Hinchliffe et al. 2022) send advance information leaflets in multiple languages to sampled households. The leaflet provides a helpline number for participants to request survey assistance in their preferred language. Options offered include British Sign Language (BSL), Gaelic, Bengali, Chinese, French, Hindi, Polish, Punjabi, Turkish, Arabic, Farsi, and Urdu. Approximately 1.8% of participants of the Health and Care Experience Survey responded to the questionnaire in a language other than English. Similarly, the Active Lives Survey (Ipsos 2023) provides FAQs translated into BSL and offered content in alternative formats and languages upon request. These accommodations included large-print versions of the paper questionnaires and the option to complete the survey in English, Arabic, Polish, Portuguese, Mandarin, or Slovak. These available language options were listed in the letters sent to potential respondents, displayed in their relevant script and language. In both the Food and You Survey (Deepchand et al. 2023) and the Survey for Londoners (Cant et al. 2022), participants could request to complete the questionnaire in another language by calling the survey helpline, or by asking someone to complete it on their behalf. In the latter survey, no interviews were requested to be completed in any other languages; however, two assisted interviews were conducted via telephone, of which only one was fully productive and included in the final dataset.

Understanding Society also provides translations for their questionnaires. At Wave 14, administered between 2022 and 2024, the questionnaire was translated into nine different languages: Bengali, Gujarati, Polish, Portuguese, Punjabi Gurmukhi, Punjabi Urdu, Turkish, Urdu, and Welsh (Kantar Public and National Centre for Social Research (NatCen) 2022). Both the Web and CAPI version of the questionnaire were translated, so that translated interviews could be conducted in any mode. A total of 43 interviewers were conducted in languages other than English: 17 in Polish, 8 in Urdu, 6 in Gujarati, 5 in Bengali, 3 in Punjabi Gurmukhi, 2 in Portuguese, and 2 in Welsh. If a sample member did not speak English or one of the nine translated languages, they could still be interviewed. In these cases, the interviewer would use someone else to translate (usually another household member).

Surveys with informative sampling frames have implemented other methods for engaging and ensuring participation of cultural and linguistic minorities. The GP Patient Survey (Ipsos 2024) is an annual survey of patient experience within primary care. It employs a simultaneous push-to-web methodology, covering every GP practice in England. The survey uses a random probability stratified sample, drawn from a named sampling frame of patients aged 16 or over who have been registered with their practice for at least six months. The availability of patient contact details enables the survey to personalise its communications and questionnaires. Both the invitation letter and key frequently asked questions (FAQ) are translated into fourteen languages (Arabic, Bengali, Chinese, French, Gujarati, Italian, Polish, Portuguese, Punjabi, Romanian, Slovak, Spanish, Turkish, and Urdu) as well as BSL. Large print and braille versions are also offered. In the 2023 iteration of the survey, 6,199 participants, who represent 0.8% of the sample, took part in a language other than English.

The Early Life Cohort Feasibility Study, administered by the Centre for Longitudinal Studies (Centre for Longitudinal Studies 2024), drew a nationally representative sample of babies born in a two-month period from all four UK nations. More than 1,900 families from England, Wales, Scotland, and Northern Ireland took part in the study, which included a survey component alongside other small-scale field measurements. As the study design focused on maximising participation from traditionally harder-to-reach populations, the sample was boosted for babies born into disadvantaged and ethnic minority families (specifically Black Caribbean, Black African, Pakistani, and Bangladeshi). Using details provided on children's birth registration records, the survey collected ethnicity data to draw the boost sample (Raybould et al. 2024). The qualitative work then employed quota samples of parents from these ethnic groups. An interesting finding was that participants reacted negatively to the idea that the ethnicity of their interviewers would be matched to their own, as they felt it would increase social pressure during the interview. This led the research team to include reassurances in the survey materials that interviewers were experienced in speaking with people from different communities. The study materials were translated into 10 languages (Arabic, Bengali, Gujarati, Polish, Punjabi/Shanmukhi, Punjabi/Gurumukhi, Romanian, Turkish, and Urdu). A translation plugin was made available on the website for web participants, and a protocol was established for using interpreters and translations in interviewer-led sessions (Raybould et al. 2024).

4 Digital exclusion

4.1 The digital divide

In recent years, self-administered surveys have grown significantly in use. However, when online surveys are the only administration mode offered for participation, the non-internet population is excluded from the onset. This exclusion originates from the *digital divide*, understood as the gap between individuals who have access to digital technologies (including both internet access and the devices required to access it, i.e. smartphones, tablets, and computers), and those who do not. Since the excluded sub-groups often differ substantially from those with internet access, online administration can introduce sampling biases and coverage error, compromising survey representativeness. The digital divide is usually conceptualised across three levels (Wei et al. 2010): *digital access*, *digital literacy*, and *digital assimilation*.

4.1.1 Digital access

Digital access refers to "*the ability to access the necessary hardware, software and internet services associated with the utilisation of digital technology*" (Connolly et al. 2025, p.3). Digital access has arguably become less concerning in recent years, as internet connectivity has been steadily increasing. In 2024 in the UK, 94% of the adult population had internet access at home, an increase of 4 percentage points from 2020, and 18 percentage points from 2011 (Office for Communications 2011, 2020, 2024). Usage has also grown: in 2016, 89% of the UK population reported having been online at least once in the last three months, a figure that climbed to 97% by 2024 (Lloyds Bank 2025). In addition, reports suggest that around 95% of adults in the UK own a smartphone (Barber 2025).

However, digital access is not determined by the mere availability of an internet connection on a smartphone, tablet, or laptop computer. The nature and functionality of the digital

devices used to access it, the ease with which the devices can be accessed, and the autonomy and reliability of internet connectivity, are also key determinants of potential differences in digital access across the population, particularly for certain sub-groups or geographic areas (Connolly, Costa-Font, and Srivastava 2025). The COVID-19 pandemic starkly highlighted these inequalities. While the lockdown restrictions increased reliance on the internet for accessing essential services, remote work, education, and staying connected, it also raised concerns about the exacerbation of existing inequalities in digital access, as the economic impacts may have meant that more households became unable to afford internet access (Baker et al. 2020). A recent literature review by Connolly, Costa-Font and Srivastava (2025) confirmed that the COVID-19 pandemic contributed to the digital exclusion of lower socio-demographic groups. While most access barriers emerging during this period have since been resolved, the situation illustrates how access inequalities can significantly affect participation in digitally delivered services, including survey research.

Differences between online and offline populations (i.e., populations without digital access) have long been a concern in survey methodology research, especially for web-based panel surveys, and panel surveys aiming to transition towards web-based self-administration. Research has shown that individuals without internet access substantially differ from online individuals, across variables such as sex, age, and education, migration status, and household size (Bach, Cornesse, and Daikeler 2024; e.g. Bosnjak et al. 2013; Cornesse and Schaurer 2021; Eckman 2016; Leenheer and Scherpenzeel 2013). Dutwin and Buskirk (2023) processed over five thousand variables from over a dozen major public surveys in the US using a machine learning algorithm and found 38 variables that generate substantive differences in responses between internet and non-internet participants. While most of these variables are socio-demographic characteristics of respondents, there are also significant differences in substantive survey variables, including responses to attitudinal and behavioural questions. This study confirms that individuals with and without internet access differ from each other in substantive aspects, including political attitudes and consumer behaviours (Bosnjak et al. 2013; Cornesse and Schaurer 2021; e.g. Zhang et al. 2009).

As the offline population is relatively small compared to the online population, including individuals without access to the internet in the sample may not improve sample representativeness across *all* relevant variables, and it may even not substantially change conclusions drawn regarding substantive research questions (Bach et al. 2024; Eckman 2016). However,, there is a general consensus that offline population inclusion strategies have a positive impact on sample composition for probability-based surveys (Cornesse and Schaurer 2021). Furthermore, Revilla *et al.* (2016) suggest that even if gains in representativeness are small, there are a few important variables (such as education) on which the inclusion of the offline population yields a more representative sample of the general population. Pforr and Dannwolf (2017) highlight that the extra cost of recruiting offline participants may be worth the investment if the substantive data of interest relate to variables that can be different for internet users and non-users. Importantly, enabling the participation of the offline population can increase the granularity of data, which can be relevant to surveys focusing on substantive characteristics of this population sub-group (Cornesse and Schaurer 2021).

However, recent evidence by Cabrera-Alvarez *et al.* (2025), in the context of Understanding Society, suggests that internet users have become increasingly representative of the general population, although some gaps persist among older adults, those less educated and other disadvantaged groups. This evidence suggests that internet exclusion may be less of a concern

as digital access increases in the UK. Similarly, Moore *et al.* (2025) suggests that CATI or CAPI non-response follow-ups in the context of Understanding Society, a web-first sequential mixed-mode longitudinal survey, may no longer be required to increase sample representativeness if digital access continues to increase.

4.1.2 Digital literacy

Access to an internet connection is not the only barrier to participation in online surveys. A binary distinction between internet users and non-users is often inadequate because internet use is a multi-dimensional and continuous characteristic (Cornesse and Schaurer 2021). For example, individuals vary widely how proficiently they interact with devices and navigate online environments.

Digital literacy, typically conceptualised as "*the degree of sophistication with which individuals are able to use digital technologies*" (Connolly et al. 2025, p. 3), encompasses both confidence and ability in using digital tools. These skills are also strongly linked to socio-demographic factors, including age, educational attainment, sex, and socioeconomic status. Variations in digital literacy manifest in *medium-related skills* (e.g., using an internet browser, email, or word processing software); *content-related skills* (e.g., creative digital production, social media engagement); and *safety and security skills*, including awareness of ethics, safety and acceptable use (see reviews in van Deursen and van Dijk 2009; Scheerder, van Deursen, and van Dijk 2017). 7.9 million people in the UK (about 15% of the adult population) lack digital skills at the "Foundation Level", understood as the eight most fundamental tasks to set up an individual for success online (Lloyds Bank 2025)[9].

When online surveys under-represent individuals with lower digital literacy, they risk non-response bias, particularly if substantive variables correlate with these socio-demographic factors. Recent research demonstrates that selective non-response driven by digital inequality can severely undermine the quality of online panel surveys (Felderer and Herzing 2023).

4.1.3 Digital assimilation

Digital assimilation refers to "*the degree to which digital technologies are incorporated and used in everyday life*" (Connolly et al. 2025, p. 3). As the third level of the digital divide, it concerns how individuals engage with digital technologies and use them to enhance social connections and values and chieve quantifiable outputs. This dimension may also influence survey participation, as some individuals with internet access and digital skills still choose not to respond. This reluctance can be derived from data privacy concerns (Roberts et al. 2022), or due to the perception that internet use is not beneficial for them (Felderer and Herzing 2023). Interestingly, Bretschi and Weiß (2023) demonstrated that only the *variety* of internet use (i.e., the number and types of activities participants engage with using the internet) was positively correlated with the willingness to participate in a web panel when participants were offered the option to switch modes. Both the *frequency* of internet use and the number of devices in the household were not significant determinants of mode switching propensity, indicating that access and skills may not be enough to guarantee participation in online

[9] The tasks are: turning on a device and enter account login information, use the available controls on the device, using the different settings on the device to make it easier to use; find and open different applications/programmes/platforms on the device; set up a connection to a Wi-fi network on the device; open an Internet browser to find and use website; keep login information and passwords secure; and update/change a password when prompted to do so (Lloyds Bank, 2025).

surveys, and that motivational factors and mode preferences may also play a significant role in this decision.

4.2 Measures to include the offline population in survey research

Three main approaches are commonly used to account for biases arising from the exclusion of survey participants due to the digital divide at the recruitment stage: implementing mixed-mode designs, providing digital access to offline populations, and facilitating access to online surveys for participants with lower digital skills.

4.2.1 Mixed-mode designs

Mixed-mode designs are the most frequently used strategy to ensure participation from offline populations. Our recent review of the UK survey landscape (Domarchi et al. 2025) found that around 90% of self-administered surveys conducted between 2018 and 2023 followed a mixed-mode strategy, most frequently combining mail-based recruitment with web self-administration. Paper questionnaires are usually not provided until later stages of contact (for example, with the second or third reminder letter), in what is usually termed a sequential design.

This approach is generally recommended in the specialised literature as means of reducing coverage error, improving response rates, and favouring cost-effectiveness (Dillman, Smyth, and Christian 2014). However, these advantages may be offset by mode effects. Mode effects occur when respondents answer differently to a survey question solely because of the mode in which it is administered (de Leeuw 2005). There are two components of mode effects: *selection effects* and *measurement effects* (Schouten et al. 2021). Selection effects arise when the mode of data collection influences *who* participates in a survey, while measurement effects occur when the mode of data collection impacts *how* participants answer the survey questions (d'Ardenne et al. 2025; Coffey et al. 2024). The presence (or absence) of interviewers, how the questions are presented, and the specific characteristics of each instrument can impact the data collected. Selection and measurement effects are usually confounded (Lugtig et al. 2011) and are therefore difficult to disentangle (Wright *et al.* 2025).

Notwithstanding these issues, there is also evidence that mixed-mode designs could improve survey participation of individuals with lower digital skills. Specifically, the experimental results reported by Felderer and Herzing (2023), who study a recruitment survey for a probability-based panel in Germany, suggest that both a sequential and a concurrent mixed-mode strategy are significantly more effective in including individuals with lower levels of digital skills, than the single-mode online strategy. Sequential push-to-web designs, widely used in current UK practice, aim to direct as many respondents as possible to the web option. While this helps reduce survey fieldwork costs, such a strategy favours participants with higher levels of digital skills and digital assimilation. From a digital access perspective, it may be desirable to offer the non-web alternative upfront or at least make clear from the outset that such an alternative will be available at a later stage, in order to reduce the risk of excluding populations with lower digital skills.

4.2.2 Equipment provision

Another way to address the coverage problem for general population surveys is to provide the necessary equipment to participate in the survey (i.e., an internet connection and an internet-

enabled device) to sample members who do not have it and accept to participate. This is the approach followed in the Longitudinal Internet Studies for the Social Sciences panel (LISS) in the Netherlands (Eckman 2016; Leenheer and Scherpenzeel 2013), the French Longitudinal Internet Studies for the Social Sciences panel (Revilla et al. 2016), and the German Internet Panel (Blom et al. 2017). Including non-internet participants in the survey via this method increases representativeness and estimate accuracy (Cornesse and Schaurer 2021), despite non-internet participants exhibiting a lower propensity to respond (Blom et al. 2017) and a higher probability of panel attrition (Revilla et al. 2016).

This approach has the advantage that both populations (with and without internet access) participate in the same survey mode, thus eliminating potential mode effects. In addition, providing internet access and equipment facilitates providing elaborate treatments (including video and audio features as well as real-time experimental splits and question filtering) to both online and offline participants (Cornesse and Schaurer 2021). However, the substantial cost of the strategy, and the logistic complications of organising the delivery of internet equipment, present a significant challenge. In addition, the method still fails to recruit participants who prefer other modes of survey administration (e.g., paper questionnaires). Furthermore, there is some evidence that offering only the online mode can still lead to moderately severe bias in certain substantive variables (especially those related with political attitudes and media consumption), and that mode-specific non-response weights may not be enough to adjust for these biases (Pforr and Dannwolf 2017).

4.2.3 Including participants with lower digital skills

Recruitment practices can also play a relevant role in facilitating the participation of individuals with lower digital skills in self-administered online surveys. For example, it has been suggested that population with lower degrees of digital literacy or assimilation may be likely to respond online if access conditions are improved during recruitment.

The inclusion of quick response (QR) codes for survey access in the invitation letter and other communication materials has been shown to increase survey participation in some studies (Endres et al. 2023; Marlar and Schreiner 2024; Maslovskaya et al. 2024), although some other experiences suggest more mixed results (Krause et al. 2024). The argument in favour of QR codes is that they may reduce the burden of survey access, as recipients with smartphones can simply scan the code instead of typing a survey URL and login credentials, which may be perceived as more difficult by some members of the population (Endres et al. 2023). Our previous evidence review (Domarchi et al. 2025) showed that until recently, in UK surveys, QR codes have only been used sparingly as survey access methods (only 10% of the reviewed survey instances used them). Experimental work by studies including the Active Lives Survey (Ipsos 2023) and the GP Patient Survey (Ipsos 2024) reveal mild and non-significant increases in survey response rates as a result of the inclusion of QR codes. The experimental study in Maslovskaya et al. (2024), in the context of the web-only 2022 Generations and Gender Survey, finds that response rates for respondents who received a QR code in their invitation letter were significantly higher than respondents who received a URL (15.2% vs 14.1%). However, they found that the QR code did not significantly improve sample composition by attracting traditionally harder-to-survey respondents, such as younger individuals, those with lower education levels, and ethnic minorities.

Sansum et al. (2024) report that ONS has also included QR codes in communication materials in four of their surveys (e.g., Vaccine Opinions Survey, Labour Force Survey, Covid Infection

Survey, and ONS Business Survey). While their report finds no significant increase in response rates due to the QR codes, they suggest that their inclusion could shift responses to smartphones (as opposed to laptops and tablets), and that they could help with access barriers including digital literacy (Sansum et al. 2024). A similar result is reported in Maslovskaya et al. (2024), where respondents in the QR condition were significantly more likely to use smartphones (59.0%) comparted to those in the URL condition (40.6%).

More recently, other ONS surveys, including the Transformed Labour Force Survey, have implemented QR codes for questionnaire access (Office for National Statistics 2025).

In addition, surveys for which a named sampling frame with contact details are available, could make use of SMS or email messages including access links to facilitate participation. Our evidence review on recruitment (Domarchi *et al.* 2025) reports some experimental results conducted as part of the GP Patient Survey, a mixed-mode repeat cross-sectional survey based on a named sampling frame of GP patients in the UK. The results indicate that SMS reminders were more effective in increasing the share of online responses

Finally, there is evidence in the literature that digital skills can vary depending on the type of device used. Research has demonstrated that smartphones and tablets have the potential to reach hard-to-survey populations (Décieux and Sischka 2024; Firchow and Mac Ginty 2017; Lugtig et al. 2019). However, it has also been acknowledged that they cannot completely substitute for the usability and comfort of large screen devices with keyboards and higher processing power (Lythreatis, Singh, and El-Kassar 2022). In addition, some users perceive smartphones as “less appropriate” than regular computers to engage in activities such as selling online, applying for a job, or participating in an educational program (Bartikowski et al. 2018). These individual preferences could mean that some respondents may not feel comfortable responding to a survey using a smartphone (Tyrell 2023), and the laptop may be their preferred option. As a general recommendation, online surveys should use mobile-first approach to design and be compatible with a range of devices and screen sizes (Wilson and Dickinson 2022) to increase participation across all population sub-groups.

5 Conclusions and recommendations

5.1 Summary of the main findings

This evidence review has examined measures to ensure that population sub-groups facing participation barriers can take part in survey research. We focused on three groups: those with disabilities and impairments, those with literacy and language limitations, and those affected by the digital divide. Table 2 summarises the main findings regarding the key participation barriers these groups encounter and the corresponding measures available to address them.

Table 2. Summary of findings from the evidence review

Group	Prevalence	Issues	Measures
(1) Disabilities and impairments			
Visually impaired and blind	· Approximately 2% of working-age adults and 9% of people of state pension age in the UK report having a visual impairment	· In general population surveys, materials are typically presented as paper-based text or electronically, which may not be usable for people with visual impairments without adaptations (risk of non-response bias, reduced survey representativeness) · People with an impaired visual field who use visual enhancing aids may struggle to get an overview of a survey communication letter or questionnaire, as such aids typically magnify only a small portion of the text at a time (risk of measurement error, item nonresponse)	· To facilitate access, information should be provided in multiple formats such as large print formats, audio versions, and braille · The survey questionnaire should support navigation and orientation by ensuring that different questions are immediately distinguishable and the beginning and end of each answer option contain as many different letters as possible · Further research is needed to determine whether expressed preferences, such as visual reading, reversed contrast text, correspond strongly with measurable aspects of reading performance, such as reading speed or critical print size
Deaf and hard of hearing	· Approximately 2% of working-age adults and 11% of people of state pension age report having a hearing loss	· People who are d/Deaf or hard-of-hearing are often excluded from participating in scientific research when data collection relies solely on the national spoken or written language (risk of non-response bias, item nonresponse, measurement error, reduced survey representativeness)	· People with hearing impairments whose first or primary language is a sign language should have access to questionnaires in a format that enables them to complete them unassisted and autonomously · Signing video displays and avatar applications have been used to administer self-completion questionnaires for people who are d/Deaf or hard-of-hearing

Table 2. Summary of findings from the evidence review (continued)

Group	Prevalence	Issues	Measures
Motor control impairments	• Around 5% of working-age adults and 15% of people of state pension age in the UK reported experiencing a motor control impairment	• Although individuals with motor control impairments are more likely to rely on computers, difficulties executing fundamental tasks required for computer interaction due to motor impairments can make participation in surveys challenging (risk of measurement error, nonresponse bias, item nonresponse, reduced survey representativeness)	• Currently, there is limited literature on measures to support the participation of people with motor control impairments in surveys • However, there is growing popularity of mobile device use which has led to a shift towards developing accessible interfaces for smartphones and tablets for people with motor control impairments
Mental health and neurodevelopmental conditions	• Approximately 12% of working-age adults and 5% of people of state pension age in the UK reported experiencing a mental health issue	• Barriers of participation in surveys for individuals with mental health and neurodevelopmental conditions can be attributed to symptoms associated with the conditions, which may affect motivation and interest, as well as reduce cognitive capacity for processing survey questions (risk of measurement error, nonresponse bias, item nonresponse, reduced survey representativeness) • Certain groups may also not fully understand the research purpose, the intended use of their data, or their right to withdraw. This raises ethical concerns	• Easy to read materials, which include images to support the meaning of text, have been used to present essential information in survey materials with reduced linguistic complexity for people with mental health and neurodevelopmental conditions • Evidence indicated that the Audio Computer-Assisted Self-Interviewing (ACASI) approach may help reduce response burden when reporting mental health symptoms and respondents reported more mental health symptoms when completing the ACASI version than when responding to the I-PAPI version • Proxy respondents can be used to provide information about a sampled individual who cannot participate due to physical or mental illness, although they should only be asked factual questions about observable actions

Table 2. Summary of findings from the evidence review (continued)

Group	Prevalence	Issues	Measures
(2) **Literacy and language limitations**			
Literacy issues	• Around 18% of adults in England have low proficiency in literacy (literacy at or below Level 1).	• Individuals with lower literacy are more likely to refuse participation, fail to return paper questionnaires, or drop out of longitudinal panels (risk of non-response bias, reduced survey representativeness). • Even when they do participate, they may have difficulty understanding the questions (risk of measurement error, item nonresponse). • This could lead participants to misinterpret questions or provide answers that do not reflect their true opinions, perceptions, or behaviours (risk of measurement error). • They may also not fully understand the research purpose, the intended use of their data, or their right to withdraw. This raises ethical concerns.	• Digital applications that use animations, illustrated scales, touch screens, icons, and read-aloud versions can help participants better understand questions in health studies. • Computer-assisted self-interviewing can be adapted with audio support, such as through auto-support or ACASI. • Mixed-mode designs that include interviewer-led modes (e.g., in-person or telephone) have been shown to substantially reduce literacy and cognitive demands, while also improving participant motivation. • Supported survey completion, where sample members can request an interviewer to assist them in responding to their questionnaire, could be an effective measure of including participants with lower literacy levels in surveys. • Using simple language and avoiding ambiguous or vague concepts greatly improves the survey experience and contributes to higher data quality.
Cultural and linguistic minorities	• Less than 2% of the population in England, Scotland, and Wales are unable to speak English (English or Welsh in Wales).	• Standard probability-based surveys often underrepresent cultural and linguistic minorities, which leads to lower response rates among these groups (risk of non-response bias, reduced survey representativeness). • Even when successfully contacted, individuals who do not speak or read the survey language may not understand the implications of participation or be able to provide informed consent without additional support (risk of measurement error). • Cultural differences and concerns about confidentiality can also make participants reluctant to share information they perceive as sensitive, further affecting data quality (risk of measurement error, item nonresponse).	• Translating survey materials into respondents' preferred languages significantly improves participation in these groups. This helps reduce non-response bias and enhances the overall representativeness of the survey. • Current best practice recommends the use of structured "team translation" approaches; most notably the TRAPD model (Translation, Review, Adjudication, Pretesting, and Documentation).

Table 2. Summary of findings from the evidence review (continued)

Group	Prevalence	Issues	Measures
(3) **Digital exclusion**			
Digital exclusion	· Digital access in the UK continues to grow. In 2024, 94% of UK adults had internet access at home, 97% reported having been online at least once in the previous three months, and 95% owned a smartphone. · However, digital skills and adoption lag behind access. It is estimated that around 15% of UK adults lack the essential digital skills required to use online tools effectively.	· Participants with lower levels of digital skills or familiarity may opt out of online self-administered surveys, either by choice or because they lack the ability to take part effectively (risk of non-response bias). · Excluding those who are offline can significantly undermine survey representativeness. This is particularly important because offline and online populations often differ substantially in key areas, such as political attitudes and consumer behaviour (risk of reduced survey representativeness).	· Weighting adjustments (e.g. post-stratification) can help correct survey estimates for coverage and non-response bias. However, these methods cannot account for behavioural or attitudinal differences between online and offline participants within the same sociodemographic groups. · Providing equipment (internet-enabled devices and internet access) can improve participation for sample members who lack the necessary resources but are willing to respond. This approach, however, is often costly and logistically complex, and it does not address the preferences of participants who would still choose other survey modes. · Mixed-mode designs that include offline alternatives, such as paper questionnaires, can effectively reduce coverage error and boost response rates. When implemented sequentially, such designs can also improve cost-effectiveness while accommodating a wider range of respondent preferences. · As there is evidence of differing digital skills according to device type, online surveys should be compatible with a range of devices and screen sizes to increase participation across all population sub-groups.

5.2 Discussion

5.2.1 The imperative of accessibility and inclusivity

Ensuring surveys are accessible and inclusive addresses a fundamental ethical duty while yielding concrete methodological gains including improved response rates, better representativeness, and higher-quality data. This view is widely held by survey organisations. The ONS Inclusive Data Taskforce in the UK has summarised this as follows:

"*Data producers should ensure that data collection instruments are accessible to all, recognising differences in language, literacy, and the relative accessibility of different modes and formats. For example, using multi-mode surveys as standard practice and implementing additional adjustments to enable the participation of adults and children with a range of*

disabilities, and those who experience other forms of exclusion, including digital exclusion" (Office for National Statistics 2021b, p.29).

The respondent-centred design framework (Wilson and Dickinson, 2022) can provide a helpful tool to achieve this objective. Respondent-centred design is defined as "*learning about the needs of those who will use your service and designing it to meet them*"[10] Respondent-centred design places inclusivity and accessibility as one of its guiding principles, and recommends involving participants from the outset in designing participation options to enhance accessibility and usability, while helping to identify and mitigate potential design flaws that could negatively affect engagement. The framework aims at designing highly accessible and usable materials to remove barriers to participation from the start and reduce survey burden for all participants to obtain high data quality.

5.2.2 Facilitating participation in large-scale probability-based surveys

The evidence reviewed indicates that participation of population sub-groups with barriers to participation can be improved by implementing measures that facilitate access for all participants. Following guidance from the GSR (Government Social Research Strategy 2021), and the Inclusive Research Guidance from the UK Government (2022), we suggest the following measures designed to improve participation:

- **Questionnaire access.** Short URL links and QR codes should be favoured over long URLs, which can lead to typing errors. Similarly, the login process should be as simple as possible to avoid non-response caused by mistakes. For surveys that use a named sampling frame with contact details, contacting participants via SMS or email can facilitate access and improve participation rates.
- **Accessibility of materials**. All survey content, including letters, communication materials, and the questionnaire itself, should be accessible to all participants. There are specific government accessibility requirements (UK Government 2016), which include:
    - Meeting level AA of the Web Content Accessibility Guidelines (as a minimum);
    - Working with the most commonly used assistive technologies, including screen magnifiers, screen readers, and speech recognition tools;
    - Including disabled people in user research; and
    - Providing an accessibility statement that explains how accessible the survey is.
- **Length of materials.** Keeping materials short and to the point reduces the demands on participants and makes the survey more accessible.
- **Age compliance.** All survey content, including letters, communication materials, and the questionnaire itself, should be tested for reading age compliance. The average reading age in the UK is nine years old.
- **Easy read/simple language.** The guidance reviewed recommends using short, clear sentences (shorter than 25 words) that convey one piece of information each; including clear instructions, facts, and statements; avoiding vague and complex terminology, acronyms, abbreviations, and contractions; limiting detailed background information; and ensuring consistency in the use of words and terminology.

[10]https://analysisfunction.civilservice.gov.uk/policy-store/inclusivity-and-accessibility-in-survey-development/#respondent-centred-design

- **Consent.** Consent forms are essential not only for obtaining full agreement from participants but also for promoting trust in the survey. Clearly stating in accessible language why, how, and when personal data and research will be used is essential for building trust with participants and can help overcome barriers to participation.
- **Demographics.** When collecting demographic information, researchers could consider gathering data on all protected characteristics (types of discrimination, including age, gender reassignment, marital status, pregnancy, disability, race, religion or belief, sex, and sexual orientation). However, it must be ensured that these questions are not overly burdensome, in order to avoid participant dropout. Researchers should also ensure that decisions on which questions to ask align with the General Data Protection Regulation (GDPR) principle of data minimisation, which requires that organisations collect and process only the personal data that is adequate, relevant, and limited to what is necessary for the intended research purpose (Data Protection Act 2018, c. 12).

A central finding of our evidence review is that increasing the available options improves inclusivity by design, as it creates the conditions for individuals who are willing to engage to actually take part. A wide range of other alternatives in both recruitment and survey administration are available to favour participation across the population sub-groups reviewed.

The specific approaches to providing these alternatives vary. Mixed-mode designs are a well-established strategy in high-quality probability-based surveys worldwide. Their strength lies in maximising participation by catering to different preferences and ensuring at least one option adapts to the requirements of each respondent. Importantly, many measures benefit multiple groups simultaneously. For example, offering a paper questionnaire assists those with lower digital skills while also facilitating participation for deaf and hard-of-hearing respondents. Similarly, including interviewer-led modes such as telephone or in-person or video interviews as part of a mixed-mode approach can support both participants with lower literacy and those who are visually impaired or blind.

These principles should also apply to surveys designed primarily for online administration. For example, providing telephone helplines or interviewer-assisted completion to assist sub-groups with barriers to participation can be a feasible way to facilitate completion. Likewise, ensuring online surveys are adaptable to a wide range of devices and screen sizes accommodates participants whose needs are best met by a specific technology. The general use of easy-to-read materials is another broadly beneficial practice that aids many population sub-groups.

5.2.3 Feasibility of specialised measures to facilitate participation

The relative effectiveness of other, more specialised measures remains a debatable issue. Since social survey research typically aims to represent the general population rather than focus on specific groups, the objective is to maximise inclusion by providing options for everyone. Techniques such as providing audio versions of questionnaires, designing video or avatar-based surveys, or developing tailored apps may improve participation for some groups. However, these can be prohibitively expensive and may not yield substantial improvements in reducing total survey error. Such options appear better suited to research specifically targeting these groups, rather than general population studies.

Similarly, translating questionnaires for individuals who cannot communicate in the original survey language is likely to benefit a relatively small number of participants. Some of the

challenges associated with questionnaire translation are related to its cost, both in terms of direct expense and of the time and resources required to produce accurate versions that preserve meaning and ensure comparability. When uptake of translated materials is low (as is often reported in UK survey practice), survey costs can be disproportionately high for limited benefit. The added respondents may not substantially improve sample representativeness or affect substantive findings. However, knowingly excluding certain groups can result in reputational damage and reduce public trust in social research. As outlined above, further research is needed to develop a framework that helps agencies determine when translations of questionnaires and materials are required. While inclusivity and accessibility considerations are essential to this decision, cost remains a key variable in ensuring the viability of a survey project.

5.2.4 Other issues

Large-scale surveys are often better positioned to implement practical measures that ensure accessibility for several groups. However, even within such surveys, some of the more costly adaptations may remain impractical. For surveys with smaller sample sizes, a more targeted approach is required. Measures must be evaluated from a cost effectiveness perspective, balancing potential gains in inclusion against the resources available.

When considering the cost perspective, it is important to distinguish between the budget of the survey organisation and the broader cost to society. Improved data for policy making can deliver substantial societal value, which may far exceed the initial survey costs. This is especially true when including large or highly prevalent population sub-groups. Furthermore, in many contexts, providing accessible participation is a legal requirement, not an optional feature. In these cases, the discussion shifts from whether to implement measures to how to meet these obligations in the most efficient and cost-effective manner.

The time horizon is also crucial for a proper evaluation. The costs of developing accessible instruments are incurred upfront, but the benefits, such as higher response rates, improved representativeness, and tools that can be reused in future surveys, often accrue over a longer period. Another key consideration is heterogeneity. An implementation may prove highly cost effective for one sub-group but not for another. Conducting a disaggregated analysis is therefore essential to determine where specific measures are feasible.

Ultimately, the decision to employ more resource intensive measures will depend on the specific objectives, scope, scale, and budget of each individual survey.

5.3 Limitations and recommendations for further research

Our review has identified various measures that can be implemented to increase survey accessibility and inclusivity. However, we found little research on the impact of these measures, not only in terms of survey costs, but also with respect to potential reduction in non-response bias, as well as improvement in sample composition, representativeness, data quality, and substantive variables. Although these effects will likely vary across surveys (according to their target populations and topics), further research is needed to assess how inclusivity efforts can enhance the quality of the data obtained from surveys and how this may affect future uses of the data. Importantly, research is also required to understand the consequences of failing to implement accessibility and inclusivity measures. Beyond the ethical imperative of inclusivity, it is necessary to examine how excluding certain sub-groups or making their participation more difficult affects survey data quality and estimators. This

aspect is particularly critical for potentially excluded groups that are likely to differ substantially from those included, such as offline populations compared with online populations. In such cases, measures to incorporate these groups into research are likely to be more urgent.

The feasibility of implementing measures to improve survey accessibility and inclusivity is inherently tied to cost. There is a clear need to study their effects in terms of both monetary expenditure and potential benefits. Even though many qualitative projects identified different needs and adaptations required for various sub-groups (Davies and Giji 2024; Robinson et al. 2024a; Robinson et al. 2024b), it is important to obtain quantitative evidence on the inclusion of different adaptations and their cost-effectiveness within constrained budgets. Our evidence review found no existing experimental research evaluating the cost efficiency of inclusivity measures within social surveys. Such experimental studies are crucial, as they could directly assess the potential reduction in total survey error achieved by including specific population sub-groups through targeted interventions.

When survey budgets are constrained, implicit choices must be made about which survey objectives to prioritise given finite resources. Research is required to develop a framework to guide these decisions and determine how to trade off inclusivity with precision, as measures to include certain population sub-groups will likely necessitate a reduced sample size to compensate their cost. In addition, research is required to assess whether priority should be given to the largest excluded groups, those where the risk of statistical bias is greatest, or those protected under equality legislation. Investigating the development and public perceptions of such decision-making frameworks would provide vital guidance for ethically defensible practice in resource-constrained contexts.

The prevalence of low literacy in the population is substantial, and as a result, there is a risk that a large portion of this subgroup is excluded from survey research. Further research is required on how best to engage groups with lower literacy levels in self-completion surveys. The effects of inclusivity practices in longitudinal surveys represent another key area for further research, as existing literature predominantly focuses on cross-sectional studies. It would be valuable to examine how investment in inclusive design (including measures explored in this review) affects long-term participant retention, trust, and data quality across survey waves. Such research could determine whether initial higher investment in accessibility is effective in recruiting a more diverse panel and in reducing attrition and bias over time.

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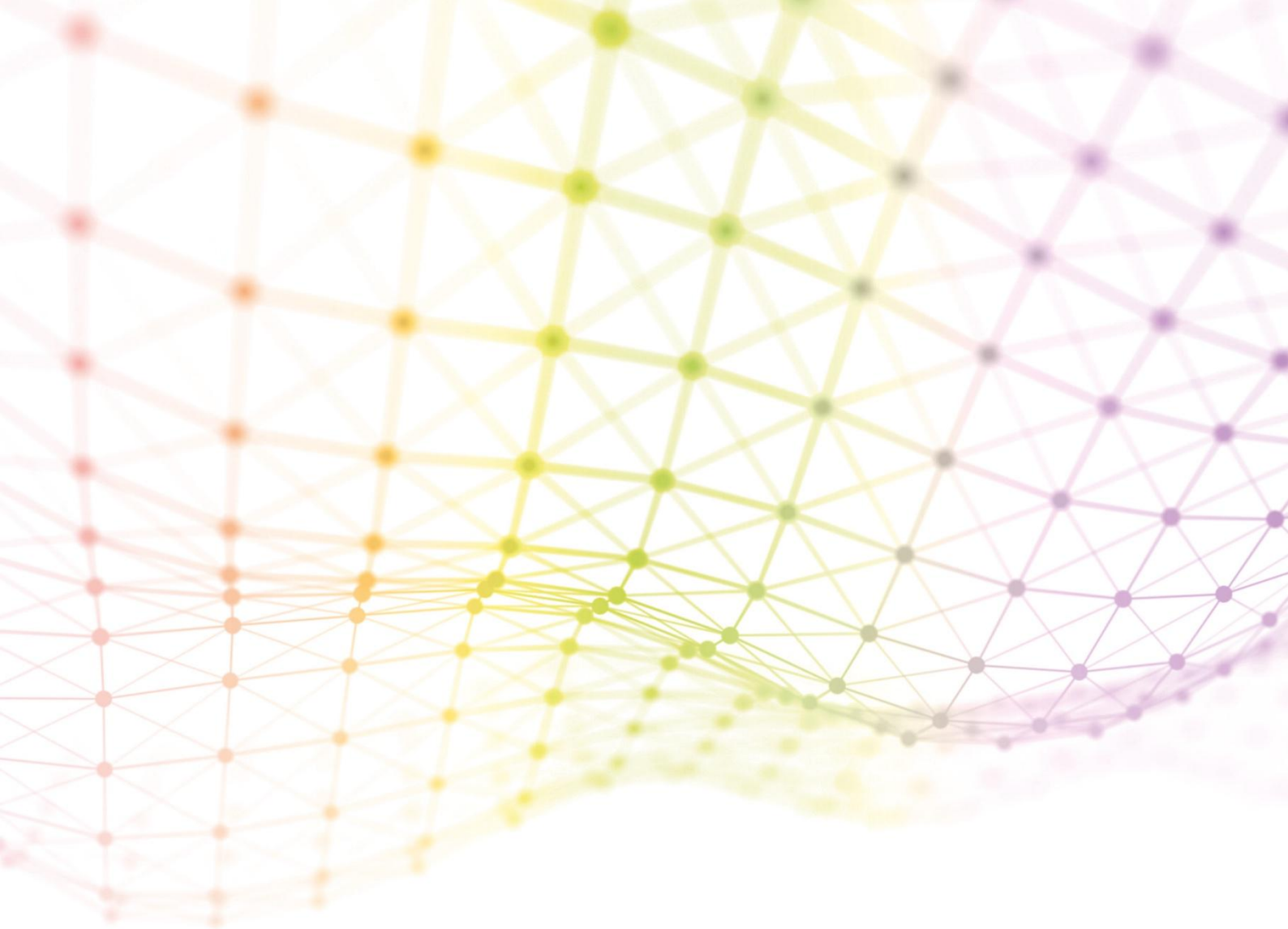

University of Essex

University of Southampton

UKRI Economic and Social Research Council

NCRM National Centre for Research Methods

Office for National Statistics

UCL

Warwick The University of Warwick

Manchester 1824 The University of Manchester

City University of London Est 1894

National Centre for Social Research

LSE The London School of Economics and Political Science

Ulster University

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