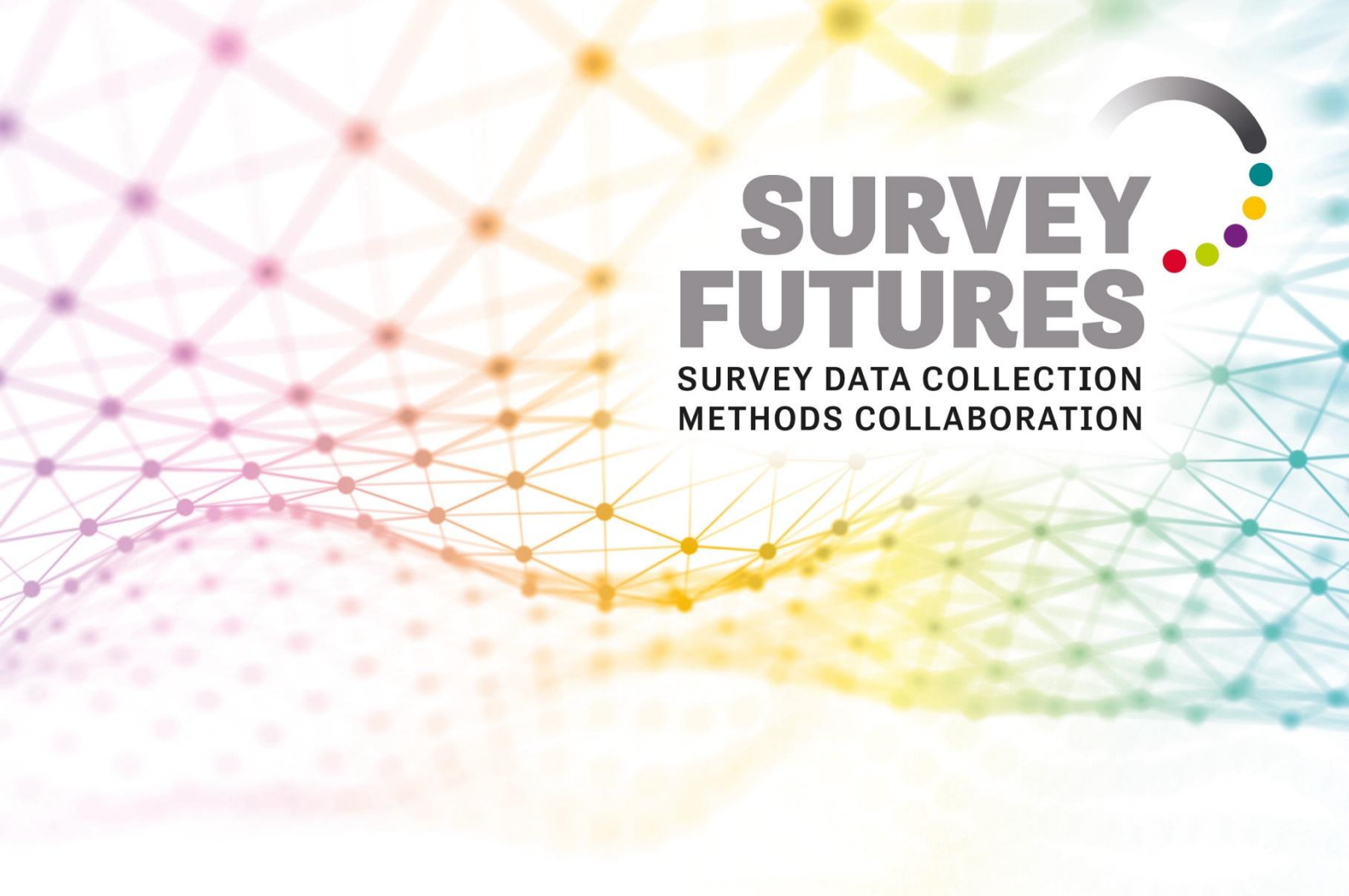




SURVEY FUTURES

**SURVEY DATA COLLECTION
METHODS COLLABORATION**

Working Paper 1:

Live Video Interviewing: Evidence of Opportunities and Challenges Across Seven Major UK Social Surveys

Gabriele Durrant¹, Sebastian Kocar², Matt Brown², Tim Hanson³, Carole Sanchez², Martin Wood⁴, Kate Taylor⁴, Maria Tsantani⁴ and Tom Huskinson⁵

¹University of Southampton; ²University College London; ³City, University of London; ⁴National Centre for Social Research; ⁵Ipsos

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Abstract

Use of live video interviewing as a method to conduct surveys became more common during the Covid-19 pandemic and in the UK, this mode of data collection was implemented in major social surveys for the first time. This paper investigates the use of LVI, focussing on opportunities and barriers, and collating evidence and experiences from seven major social surveys in the UK, with an emphasis on longitudinal surveys. The specific aims are the investigation of: uptake and response rates to LVI, the characteristics of those that responded via LVI, and the feasibility of collecting complex elements via LVI, such as consent, cognitive assessments and sensitive questions. One of the main findings is that LVI in the UK surveys analysed was used in different ways: either as the only/primary survey mode when in-person/face-to-face data collection was not possible, or as a complementary mode in mixed-mode designs. The results suggest that, if LVI were the only or primary data collection mode, response rates would be notably lower than in alternative modes – for both cross-sectional and longitudinal studies. There is also some evidence that lower response rates in LVI could potentially lead to an increase in representation bias. On the other hand, there are encouraging findings, including that once respondents agree to participate via LVI, this mode proves to be a suitable approach for collecting complex elements. This is a key finding since previous research has identified limitations of other remote methods for collecting this kind of data, which is an important component of many studies, especially longitudinal studies. Overall, the evidence from this study suggests that LVI, under certain conditions, can be a suitable *complementary* data collection mode in a mixed-mode survey design, offering potentially more cost-efficient fieldwork. We identify particular feasibility advantages for longitudinal surveys. An increase in LVI uptake in both longitudinal and cross-sectional surveys may be expected over time as online working becomes increasingly common and some barriers to LVI can be addressed. Further LVI development of fieldwork procedures are required.

Keywords: Live video interviewing, longitudinal studies, major UK social surveys, mode selection effects, response rate, representativeness, collection of complex data, consent, sensitive questions.

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1. Introduction

The COVID-19 pandemic had a significant impact on survey data collection methods and led to a rapid move to remote data collection, including online and telephone. The pandemic was also a catalyst for further development of either existing or new and innovative data collection approaches, including live video (personal) interviewing¹ (in the following abbreviated as LVI). Whilst this method was not new and had been explored to a limited degree before the pandemic (e.g., Anderson, 2008; Jeannis et al., 2013; Schober, 2018) - including in qualitative research (e.g., Deakin & Wakefield, 2014; Irani, 2019) – the approach has become increasingly important since then (e.g., Conrad et al., 2023; Endres et al., 2023; Phillips et al., 2023; Schober et al., 2023). In the UK, large-scale social surveys began making use of this method for the first time (e.g., Hanson et al., 2023). A key attraction is that LVI shares many properties with in-person interviewing, meaning mode differences between the two modes should be minimal (Endres et al., 2023).

In addition, in-person surveys² have been facing many challenges for some time, including falling response rates, increasing costs and pressures on the interviewer workforce, again increasing the trend to move to remote data collection. However, long surveys or those involving complex elements such as cognitive assessments, questions around personal networks or collection of data linkage consents can be difficult to move from in-person to online self-administered data collection. As a result, a number of

¹ We distinguish between three types of video interviewing methods: live video (personal) interviewing (LVI), which resembles face-to-face interviews but is conducted via a video conferencing system, prerecorded video interviewing, which is a self-interviewing approach using videos embedded in questionnaires (Conrad et al., 2023), and Artificial Intelligence (AI) supported video interviewing (Hohne et al., 2024). This paper is focused on live video interviewing that includes interviewer administration.

² In this study, we use the terminology 'in-person' interviewing instead of 'face-to-face' interviewing, since LVI is regarded by some authors as face-to-face too.

surveys that were typically conducted in-person, explored the use of LVI during the pandemic. Once restrictions lifted, many of these surveys reverted to in-person interviewing, but some continued to offer LVI as an option. Whilst different approaches of data collection have been and continue to be used, LVI can be a cost-effective alternative with a number of advantages. Offering an alternative or additional way to respond can potentially increase response rate and representation. Hence, LVI could provide a promising approach to data collection beyond the COVID-19 pandemic. Whilst more recent studies on LVI have emerged (e.g., Conrad et al., 2023; Endres et al., 2023; Schober et al., 2023; West et al., 2022), our understanding of the use of LVI in longitudinal surveys, and for major social surveys in the UK is to date very limited. Given these considerations, it is important to better understand LVI, and to explore if it is indeed a feasible mode of data collection post-pandemic.

This paper focusses on LVI and reviews existing evidence and experiences with a focus on longitudinal surveys in the UK. Whilst we draw on experiences from other countries, the emphasis is on advancements, opportunities and barriers of LVI in UK social surveys. The paper reviews evidence from across seven major UK surveys and aims to learn lessons for the future use of LVI. The specific aims of this paper are the investigation of: uptake and response rate to LVI, the characteristics of those that responded via LVI, and the feasibility of conducting complex elements, such as asking for consent for administrative data linkage, cognitive assessments or sensitive questions. We aim to answer the following research questions:

following research questions:

1. What is the uptake of LVI (response rates), also in comparison to alternative modes?
2. What are the characteristics of those that respond via LVI?
3. Are there advantages in using LVI when collecting complex elements that otherwise would not be easily possible to collect, e.g., via web?

The key overarching questions are:

4. Is LVI a feasible option for data collection, also post-pandemic?
5. If yes, under which circumstances does LVI provide a promising approach for UK social surveys?

All seven UK surveys considered here used LVI for the first time between 2020 and 2023, as either their primary or as an alternative mode (either in parallel or in sequence with one or more alternative modes). The reasons for using LVI were originally linked to the onset of the COVID-19 pandemic, during which time in-person contact was not allowed. The purpose of LVI was therefore to replace and imitate as much as possible in-person data collection. Further reasons for LVI implementation were to increase response rates, and to draw in respondents that otherwise would not have responded. In addition to different LVI implementations, the seven surveys all have different designs, and focus on different topics and target populations, and hence represent a rich study source to explore LVI. Five of the seven studies are longitudinal studies, including one where LVI was used in the first wave, the other two are cross-sectional.

The remainder of the paper is structured as follows. Drawing on the international context, we first review existing evidence from outside the UK in line with our research questions. The data section presents the seven surveys, their relevant design features and

differences in using LVI. The results section pulls out findings from across the seven surveys to address each of the research questions in turn. The discussion and conclusion section summarises key findings, identifies opportunities and barriers of LVI uptake, puts the findings into the international context, lists the limitations of the study and makes recommendations for next steps and future research.

2. Literature Review

The primary concerns when comparing LVI to other modes include survey completion, recruitment outcomes and data quality (Anderson, 2008). In the following, we elaborate on the factors associated with unit nonresponse, representation and the collection of complex elements by reviewing the existing literature.

2.1 Uptake of LVI

There are several reasons why response rates to LVI could differ from other modes, such as in-person interviewing. On the one hand, problems of identifying suitable time slots and setting up an online call, connectivity and technical problems³ such as an absence or a failed internet connection, distance-related concerns such as respondent distractions that are more challenging to manage virtually, difficulties in scheduling and maintaining interviews, and privacy concerns related to the internet could all serve as barriers to participation (Kunz et al., 2023; Schober et al., 2020; Van Zeeland et al., 2021). On the other hand, it has been reported that rapport can be established just as effectively

³ Guggenheim and Howell (2020) reported various technical problems beyond those associated with internet connection that participants contacted the data collector to address. These included issues with or refusal for software installation, using alternative video software, inadequate devices, and device batteries running out of energy.

in LVI as in in-person surveys (Sun et al., 2021), and whilst evidence suggests that respondents still tend to prefer in-person interviews over LVI (Selvam et al., 2020), specific types of respondents might be more inclined to participate in LVI. Those include people unwilling to participate in in-person surveys, those requiring sensory assistance, and non-native speakers (Schober et al., 2020). As a result, providing an additional mode of survey data collection besides in-person interviewing (or other modes) could potentially result in an increase in the total response rate (Jeannis et al., 2013).

The existing evidence - currently available for cross-sectional surveys - supports, however, the assertion that specifics of LVI and associated issues are more likely to negatively impact unit⁴ response rates. Guggenheim and Howell (2021) report that LVI, as the first mode in a mixed-mode design, yielded lower responses compared to web-only or mixed-web (i.e., web-first and phone). Similar evidence is presented by Conrad et al. (2023), who collected survey data from two nonprobability online panel samples and confirmed substantially lower rates for LVI than for prerecorded video interviews and web. Not only that, but the authors also report that the design of their study had to be adjusted due to a very low response rate (i.e., <3%) when combining address-based sampling and LVI in a pilot survey (Conrad et al., 2023). In a similar study conducted in Australia, response rates were compared between LVI and the online mode (sampling frame: probability online panel), as well as Random Digit Dialling Computer Assisted Telephone Interviewing (RDD CATI) and RDD text-to-web. LVI response rates were the lowest among all modes. Specifically, the cumulative response rate⁵ for LVI was almost six times lower than for web completion (where online panel members were used to online completion), with low participation consent rate and appointment rate in the LVI survey being the main reasons for

⁴ On the other hand, Endres et al. (2023) presented evidence indicating that item nonresponse was similar in in-person and LVI.

⁵ In the online panel context, the cumulative response rate (as defined by Callegaro & DiSogra, 2008) represents the final response rate, incorporating recruitment, profile, retention, and completion rates.

substantial cumulative response rate differences (Phillips et al., 2023). Lower response rates for LVI in Conrad et al. (2023) and Phillips et al. (2023) can also be explained by the fact that online panel members are more accustomed to self-administered web surveys or even prerecorded video interviews (which are essentially web surveys with video instead of text). However, as time moves on and more people are getting used to video calls being part of their work and day-to-day lives, the willingness to take part via LVI could increase.

Furthermore, to the best of our knowledge, there is no existing literature on response rates in longitudinal studies that switched to LVI and evidence on how they may change after incorporating this emerging survey mode. In the UK context, evidence on participation in surveys using LVI, for both cross-sectional and longitudinal, has been very scarce so far. Additionally, unit nonresponse in LVI may be differential, implying that the challenge extends beyond a reduction in sample size; it also involves the fundamental distinction in various characteristics between respondents and nonrespondents specifically associated with this survey mode.

2.2 LVI and representation

LVI requires both the technology necessary to participate in video interviews, including an internet connection and hardware (i.e., predominantly coverage-related issues), as well as the willingness to participate via that mode (i.e., nonresponse-related issues). First, not everyone has access to video communication technology (Schober et al., 2020). Internet access and use are reported to be associated with individual or household characteristics; they also differ between geographical regions, at least in a country like the UK (Office for National Statistics, 2021). For scientific reasons, more specifically to mitigate the bias associated with under-coverage of people without access to the internet or the necessary hardware, providing such resources to respondents lacking

access could be considered. However, this could introduce both budgetary issues, increasing data collection expenses, and potentially ethical concerns, burdening those who are not comfortable with responding via video (Schober et al., 2020).

Second, several factors could explain why respondents might not be comfortable participating in LVI: perceived difficulty of use, perceived lack of value, perceived lack of enjoyment, and relative discomfort disclosing sensitive information via LVI (Schober et al., 2023). Additionally, there might be interviewer effects specific to LVI that impact on respondent participation – certain respondents might be more willing to respond to LVI with interviewers with specific characteristics than others (West et al., 2022), although evidence on interviewer effects from LVI so far suggest them to be smaller than for in-person interviewing. On the other hand, there are some perceived advantages to LVI. Some respondents may be reluctant to let interviewers into their homes (e.g. for health or anxiety reasons), or because in their home there is no room to have sufficient privacy to convey sensitive information, with LVI being able to address such concerns. LVI may also offer more flexibility in terms of making appointments. For example, it would be less common to invite an interviewer to your workplace, but it is possible to conduct LVI at the office, e.g., during a break, or whilst travelling. It has been generally believed that particular demographic groups, including those with more technological experience such as younger adults or highly educated or professional staff that use video conferencing regularly in their work environments, would be more attracted to LVI (Anderson, 2008), which could be advantageous for drawing in groups otherwise less likely to take part. Additionally, personality profiles could also explain participation in LVI – extroverted individuals might be more concerned about their intimacy since they

cannot connect personally with the interviewer as effectively as they can in-person (Sun et al., 2021).

More recent evidence on representation bias in LVI samples is somewhat mixed. While Schober et al. (2023) do not find any socio-demographic characteristics that could predict willingness to participate in LVI, some other studies find representation bias introduced by at least one demographic characteristic. Their samples tended to be skewed towards more educated individuals (Conrad et al., 2023; Dulaney et al., 2023; Guggenheim & Howell, 2021; Martin & Fradier, 2023; Phillips et al., 2023), and younger participants (Dulaney et al., 2023; Martin & Fradier, 2023; Phillips et al., 2023; Thorolfsson et al., 2023). In the U.S. context, LVI respondents were additionally more likely to be either married or never married (as supposed to divorced, widowed), not living in single person households, white non-Hispanic and English-speaking, as well as Democrats⁶ (Dulaney et al., 2023; Guggenheim & Howell, 2021). The evidence on gender profiles is much more mixed, even within the same country. While Dulaney et al. (2023) did not find any differences regarding gender in the U.S. context, Guggenheim and Howell (2021) reported consistent overrepresentation of women across all their modes, including in-person, web, and LVI samples. On the contrary, Martin and Fradier (2023, France) and Phillips et al. (2023, Australia) report an overrepresentation of men in their LVI samples; it is noteworthy that in Australia, this occurred despite the sample being selected from a

⁶ Additionally, in a longitudinal context, Dulaney et al. (2023) examined the profiles of participants who transitioned from face-to-face or telephone mode (in wave 1) to LVI (in wave 2). The socio-demographic profiles of those who switched to video were found to be quite similar to those who were more likely to participate via video in the initial wave. These profiles included younger and middle-aged individuals, married participants, and those with a college education.

probability online panel, which traditionally included more women than men in their panel surveys.

2.3 LVI and collection of complex elements

Beyond its impact on unit response rates and sample representation, LVI as a survey mode could potentially influence the collection of particular types of survey data differently from other more traditional modes of data collection. These types of data, which we refer to as complex elements, include various survey questions and tasks, such as collecting consent for administrative data linkage or collection of biomarkers, complex measures such as cognitive assessments, and collecting data on sensitive topics. When it comes to gathering such data, LVI could present both advantages, for example, interviewers are able to explain complex tasks such as cognitive assessments which is not possible in self-administered modes, and disadvantages, including the difficulty of obtaining consent without the interviewer's physical presence. Nevertheless, whilst Conrad et al. (2023) recognised the importance of investigating the issue of collecting such data via LVI by exploring the effect on engagement, disclosure and conscientiousness, the existing literature on these topics is relatively sparse.

Collecting consent in social surveys, such as for linkage of administrative data, social network data, or physical and biomarker data collection, has been an important subject of methodological investigation in both cross-sectional and longitudinal surveys. However, to the best of our knowledge, there is no evidence on consent rates collected via LVI. Nevertheless, the existing literature on collecting consent via different modes consistently shows that consent rates tend to be higher in interviewer-administered modes than in self-administered modes, such as mail or online modes (Al Baghal et al.,

2020; Jäckle et al., 2021; Jäckle et al., 2022; Jäckle et al., 2023; Sakshaug et al., 2017; Thornby et al., 2018). This could be attributed to differences in attitudes towards privacy and data security, with online respondents typically being more concerned, as well as the cognitive process of consenting, such as the fact that less time is spent on this task in self-administered surveys (Jäckle et al., 2022). The cognitive process can be associated with an issue of understanding of the consent request in self-administered surveys, including the challenge of verifying if respondents understood the request (Olson et al., 2021). Additionally, it appears to be easier to get a 'foot in the door' in in-person surveys, with respondents in this mode tending to exhibit a more acquiescent disposition due to social norms (Al Baghal et al., 2020). On the other hand, the evidence on the differences in consent rates within interviewer-administered modes is more mixed; whilst certain studies reported higher rates in in-person than telephone surveys (Al Baghal et al., 2020; Sakshaug et al., 2012), other studies reported comparable consent rates (Thornby et al., 2018).

The collection of survey data with **complex measures**, such as cognitive tests, occupation and industry coding, and event histories, is an aspect of video-administration that has not yet been sufficiently explored. LVI has the potential to offer certain benefits, as existing literature suggests that interviewer-administration is generally more suitable for administering those measures due to their complexity than self-administration (e.g., Emery et al., 2023; Ofstedal et al., 2021; Peycheva et al., 2021). This recommendation is based on previous research comparing in-person and web modes, which has observed measurement mode effects when assessing cognitive ability (Al Baghal, 2019; Gooch, 2015; Ofstedal et al., 2021), psychological functioning (Zager Kocjan et al., 2023), and

oral health-related quality of life (Tsakos et al., 2008). It also identified higher levels of item nonresponse when collecting event history data online (Emery et al., 2023). These issues can represent challenges for longitudinal studies that add the web as an additional mode to in-person interviewing (Al Baghal, 2019; Ofstedal et al., 2021) and can be an argument for implementing LVI rather than web. On the other hand, interviewer-administered modes without a physical presence of an interviewer (including LVI and telephone) have their own specifics regarding interviewer-respondent interactions and presentation of complex measures, which can have both impacts on measurement and completion rates. For example, Ofstedal et al. (2021) reported certain differences between in-person interviewing and telephone when administering cognitive ability tests, and Silber et al. (2024) reported relatively low unit response rates and differential nonresponse when collecting complex egocentric network data via LVI.

Another challenge in collecting survey data via LVI is the issue of **sensitivity** in the virtual presence of an interviewer. If questions are sensitive, respondents might provide either socially desirable responses or no response at all (Sun et al., 2021). Similar to the in-person mode, the presence of an interviewer during LVI can lead to a lower propensity to disclose sensitive information and a higher likelihood of item nonresponse to sensitive questions compared to the online mode (Conrad et al., 2023). There may be additional issues associated with LVI compared to the in-person mode, such as nonverbal expressions in response to sensitive questions during a video call (West et al., 2022), including the interviewer's gaze direction and the size of their image on the respondent's screen (Schober et al., 2020). On the other hand, West et al. (2022) did not find an association between item sensitivity and interviewer effects when comparing LVI and

prerecorded video interviewing, and Sun et al. (2021) reported similar levels of disclosure of sensitive information and item nonresponse in in-person and LVI modes. Moreover, according to Endres et al. (2023), the issue of social desirability in LVI is less pronounced for time series studies that previously used the in-person mode due to their comparability. There may also be additional implementation and response challenges, e.g., when respondents should answer sensitive questions without the interviewer seeing their responses. In in-person surveys, this may be achieved by showcards or the interviewer handing the survey tool to the respondent, but in LVI it may be necessary to employ video screen sharing or potentially to direct respondents to an external web link shared in the chat window during the online call for completion (Schober et al., 2020). There could also be advantages in asking sensitive questions via LVI since it may be easier for the respondent to create privacy (e.g., via sitting in a non-communal room in the house).

3. Data

This study uses data from seven surveys conducted in the UK between 2020 and 2023, employing LVI as one of the data collection modes: the National Child Development Study (NCDS, Age 65 Sweep), the 1970 British Cohort Study (BCS70, Age 53 Sweep), Next Steps (Age 32 Survey), Children of the 2020s (Cot20s, Wave 1 Survey), the English Longitudinal Study of Ageing (ELSA, Wave 10 Survey), the European Social Survey (ESS, Round 10 Survey, United Kingdom) and the Health Survey for England (HSE) pilot from 2021. All studies, except for the ESS Round 10 (managed by City, University of London) and HSE, are longitudinal studies that collect data from samples of the same

respondents, at regular intervals. These panel studies are managed or co-managed by University College London, and data were collected by three social research fieldwork agencies: the National Centre for Social Research, Ipsos UK, and Verian (formerly Kantar Public).

The longitudinal surveys investigated in this study cover a wide range of ages within the population, from infants (e.g., Cot20s, data were collected from their parents) to older adults (e.g., ELSA, over 50s). Furthermore, ESS Round 10 and HSE as the only two non-longitudinal surveys, defined their populations as the general population in the UK aged 15 and above (ESS) or the population living in private households in England and aged 2 and above, with parents providing information about their children aged 2-12 (HSE).

In all seven surveys, LVI data collection commenced after the onset of the COVID-19 pandemic in 2020. Reasons for LVI implementation and its usage varied, acting either as the only or primary mode in a particular phase (NCDS, BCS70, ELSA), or as a supplementary mode to maximise response (NCDS, BCS70, Next Steps, Cot20s, ESS, ELSA, HSE pilot). In a limited number of studies, it was used for cases that did not respond in a different mode (e.g., via web in Next Steps) or provided in areas where in-person interviewing was not possible (as no in-person interviewers were available) or not permitted due to national restrictions (e.g., Northern Ireland in ESS).

As a result, the sizes of survey samples utilizing LVI differed across the studies. For instance, in BCS70 Age 53 Sweep, 3,467 (about 48%) of all interviews were conducted using LVI. On the other hand, in Cot20s, only 99 (about 1%) of all interviews were conducted using LVI, and in ESS Round 10, only 55 LVI interviews were carried out (about 5% of all interviews conducted in the UK). As ESS is a cross-national comparative study,

we observe that in some countries the share of LVI interviews was notably higher, ranging between 15% and 37% across six countries (with the highest in Iceland) (Thorolfsson et al., 2023).

For an overview of the seven surveys used in this study, their different design features and the different implementations of LVI, please refer to Table 1. (For more information about study designs, please refer to the Centre for Longitudinal Studies (n.d.-a, n.d.-b, n.d.-c, n.d.-d), English Longitudinal Study of Ageing (n.d.), National Health Service (n.d.), and European Social Survey (n.d.).)

Table 1: Overview and characteristics of the seven UK surveys investigated in this study, employing LVI between 2020-2023.

Study	Wave/ sweep or round	Sample or cohort information	Study management	Fieldwork agency	Data collection period (LVI)	LVI designs/ conditions	Sample sizes
<i>National Child Development Study (NCDS)</i>	Age 65	The birth cohort in Great Britain was drawn from a singular week of births that occurred in 1958. This cohort represents the general population and was not clustered.	Centre for Longitudinal Studies, University College London	National Centre for Social Research and Verian (formerly Kantar Public)	January 2020 - November 2023	Survey initially launched in-person interviewing in January 2020 but paused in March due to restrictions. Re-launched with LVI-only approach between Autumn 2021 and Spring 2022. LVI then offered as alternative to in-person interviewing between Spring 2022 and November 2023.	LVI: 2,283 In-person: 5,238
<i>British Cohort Study (BCS70)</i>	Age 53	The birth cohort in Great Britain was drawn from a singular week of births that occurred in 1970. This cohort represents the general population and was not clustered.	Centre for Longitudinal Studies, University College London	National Centre for Social Research and Verian (formerly Kantar Public)	Autumn 2021 - November 2023	Survey launched with LVI only approach, Autumn 2021 to Spring 2022. LVI then offered as alternative to in-person interviewing between Spring 2022 and November 2023.	LVI: 3,467 In person: 3,721
<i>Next Steps (NS) (previously known as Longitudinal Study of Young People in England, LSYPE)</i>	Sweep 9	Probability sample with boost of minority ethnic groups. At the start of the survey in 2004, sampled children were 13/14 years of age, and in Sweep 9, they were 32 years of age.	Centre for Longitudinal Studies, University College London	Ipsos UK	April 2022 - August 2023	Participants first invited to take part online. LVI was one of the modes that was offered to those who did not respond online within 3 weeks.	LVI: 8 Other modes (online, in-person, secondary device (tablet), phone): 6,972
<i>Children of the 2020s (Cot20s)</i>	Wave 1	Clustered probability sample of children aged 9 months in England. Interviews in Wave 1 took place as close as possible to the date that children turned nine months old.	University College London	Ipsos UK	June - October 2022	Interviewers were instructed to prioritize in-person interviewing over LVI and phone. LVI was initially considered as a mode to maximise response rates due to in-person interviewing being restricted or less desired during COVID-19.	LVI: 99 Other modes (in-person, telephone): 8,469
<i>English Longitudinal Study of Ageing (ELSA)</i>	Wave 10	Individuals in England, originally selected using a two-step probability sampling method for the Health Survey for England and aged 50 years or older at the start of the survey in 2002 or during the subsequent refreshment waves (3, 4, 6, 7, or 9).	University College London	National Centre for Social Research	Late 2020 - 2022	LVI-only approach was used during the early phase when in-person interviewing was not allowed. Subsequently, LVI was a second option (in-person first).	LVI: 1,213 Other modes (in-person, telephone): 5,050
<i>European Social Survey (ESS) (United Kingdom)</i>	ESS Round 10 (United Kingdom)	Random probability sampling was carried out to generate a general population cross-sectional sample comprising individuals aged 15 and above.	City, University of London	National Centre for Social Research	August 2021 - September 2022	Initially, LVI could only be offered following a refusal to take part in an in-person interview. Later in fieldwork, LVI could be offered at first contact as an equal option to in-person interviewing.	LVI: 55 In-person: 1,090
<i>Health Survey for England (HSE)</i>	HSE 2021 pilot	HSE is representative of the population living in private households in England. It uses the Postcode Address File as the sampling frame within a multi-stage stratified probability sampling design.	NatCen, University of London	NatCen	Early 2021	LVI was employed in a pilot, which adopted an opt-in approach with sample members invited by letter to prompt them to provide contact details via an online form or a freephone number. In the first stage of the pilot, interviewers proactively suggested LVI, and in the second stage, participants could choose between telephone or LVI.	LVI: 51 Telephone: 747

4. Analysis and results

In this section, we begin by examining the LVI uptake and associated response rates for all seven UK surveys. We then explore the socio-demographic composition of both LVI and non-LVI samples to assess their comparability with each other and with the demographics of the overall population. We conclude this analysis section by discussing how LVI performs in collecting survey data that are traditionally more challenging to obtain in survey modes that are not in-person, including securing participant consent, conducting complex cognitive assessments and asking sensitive questions.

4.1 Response rate analysis

As previously discussed in the Data section, LVI was implemented for two central reasons: (1) as a substitute for the in-person mode due to various restrictions (NCDS, BCS70, ELSA) and hence as the first or main data collection method in particular stages, and (2) as a supplementary survey mode to increase response (Next Steps, Cot20s, ESS, HSE 2021 pilot). In other words, LVI was the *first mode* of issue for subsamples in some studies and an *additional (or supplementary) mode* for other studies. Consequently, we are presenting response results for these two groups of studies separately.

LVI first mode of issue

In three of the seven analysed studies, LVI was used more extensively, resulting in larger samples of respondents who participated via LVI. Importantly, response rates can be calculated for those issued to LVI and for those issued to other modes, although the allocation was not random in any of the studies. Response rates (RR), presented in Figure 1, are calculated as the proportion of eligible respondents who were either (i) initially

issued to LVI, or (ii) initially issued to in-person interviewing, and participated in the survey.

NCDS. In the National Child Development Study Age 65 Sweep, LVI was employed in three different stages, the first two being video-only/video-first. In the third stage, which was predominantly in-person-first, a video call was an option but not promoted, meaning it was offered if requested. (For more information see Appendix A.)

Across all three stages combined, more interviews were issued to in-person interviewing (n=4,559) than to LVI (n=3,090). Nevertheless, those who were issued to in-person interviewing were able, in principle, to participate via LVI, and vice versa. Out of 4,559 who were issued to in-person interviewing, 4,394 were eligible and 3,126 of them (or 71%) participated via in-person interviewing, while 29 (or 1%) participated via LVI. Out of the 3,090 issued to LVI, 3,001 were eligible and 1,432 (or 48%) participated via LVI and 415 (or 14%) via in-person interviewing. It is likely that the total response rate after both modes is lower in the LVI-first group (RR=62%) than the in-person-first group (RR=72%), because some of the former sample members were not approached by an in-person interviewer as none were available. In comparison to pre-COVID waves of the same Age 65 Sweep that were in-person and conducted in early-2020 (RR=77%), response rates across the three stages in 2021-2023 were lower in both in-person-issued (RR=72%) and LVI-issued groups (RR=62%). However, there are issues with comparing the pre-COVID response rate as it is likely inflated because it excludes cases who were unproductive before COVID and reissued again after COVID (to LVI or in-person). While an experimental design was not employed, it is noteworthy that in-person interviewing outperformed LVI, as the results suggest that it was more likely to be the preferred mode.

BCS70. In the British Cohort Study (BCS70) Age 53 Sweep, LVI was employed in four different stages, the first three being video-only/video-first. Like in the NCDS Age 65 Sweep, participants issued to in-person interviewing had the option of a video call if requested in the last stage, and vice versa. (For more information see Appendix A.)

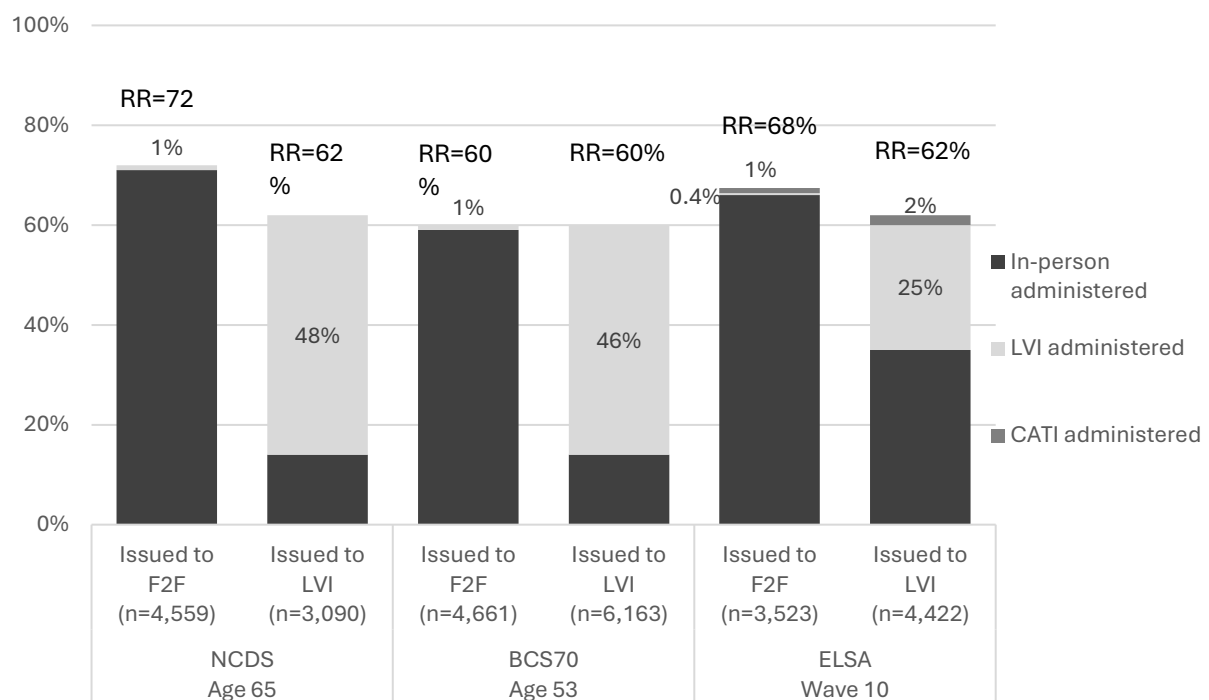
Across the analysed stages, more interviews were issued to LVI (57%) than to in-person interviewing (43%). Out of 6,163 who were issued to LVI, 6,114 were eligible and 2,842 of them (or 46%) participated via LVI, while 830 (or 14%) participated via in-person interviewing. Out of the 4,661 issued to in-person interviewing, 4,619 were eligible and 2,732 (or 59%) participated via in-person interviewing and 62 (or 1%) via LVI. The final response rate was the same in both groups, issued to in-person interviewing and issued to LVI (i.e., RR=60%). In comparison to the pre-COVID sweep, namely BCS70 Age 46 conducted in 2016-2018 (with a RR of 73%), response rates were thus substantially lower in the post-COVID BCS70 sweep.

ELSA. In the 10th wave of the English Longitudinal Study of Ageing, LVI was employed in three different stages, the first two being video-only/video-first. In the LVI-only stage, participants issued to LVI had the option of an in-person or telephone interview if requested. In the in-person-first stage, like the NCDS Age 65 Sweep and BCS70 Age 53 Sweep, participants had the option of a video call (or a telephone interview) if requested. (For more information see Appendix A.)

Across the analysed stages, more cases were initially allocated to LVI-first (n=4,422) than to in-person interviewing (n=3,523), and the overall response rate was higher for the in-person-first group (68%) than for the LVI-first group (62%). In the LVI-first group, which also included LVI-first from the in-person-first stage, only 25% responded via LVI. Cases

that were not interviewed via LVI in the LVI-first stage were interviewed in-person or by telephone, resulting in 1,432 in-person interviews (35%) and 81 telephone interviews (2%). It is worth mentioning that the proportion of respondents who were initially issued to LVI but could not be interviewed via that mode due to the absence of a telephone number or email address, was much larger in ELSA Wave 10 than in the NCDS or BCS70 sweeps. Of those issued to in-person interviewing in the last in-person first stage, 2,177 were interviewed via that mode, 33 were interviewed via telephone, and 14 were interviewed via LVI. The total response rate for the in-person-first stage was 68%, and LVI, as a response maximisation mode, contributed less than 1% to the total response rate in that stage.

Figure 1: Response rate in the studies with LVI as the first or only mode of issue (for during and post-COVID times combined, 2021-2023).



LVI as a supplementary survey mode

In the other four analysed studies, Next Steps, Children of the 2020s, European Social Survey (ESS UK) and Health Survey for England, LVI was used as an alternative (or supplementary) mode and, as a result, the samples of cohort member who participated via LVI were rather small. LVI was used in these surveys in different ways:

- In the Next Steps Sweep 9 study, LVI was never used as the primary survey mode. Next Steps employed a sequential mixed mode design in which participants were first invited to participate via web. Web non-respondents were issued to in-person interviewers who were able to offer LVI in addition to a standard in-person interview, completion via a tablet or a telephone interview. In the end, LVI contributed only 8 interviews (or 0.1%, see Figure 2), in addition to 5,937 (or 85%) online, 737 (or 11%) in-person, 159 (or about 2%) on secondary device, and 139 (or about 2%) via telephone.
- In the Children of the 2020s study, a concurrent mixed-mode design was used. However, interviewers were instructed to prioritise the modes via negotiation with respondents as follows: in-person (top priority), LVI (next priority), and telephone (lowest priority). In the end, LVI contributed 99 interviews (or 1.2%), in addition to 7,273 interviews (or 84.0%) completed via in-person interviewing and 1,256 (or 15%) by telephone⁷.
- In the European Social Survey (UK), in-person fieldwork with LVI option was used. LVI was the only approach offered in Northern Ireland since in-person interviews

⁷ Even though interviewers were instructed to prioritize LVI over telephone in both Next Steps and Cot20s surveys, ultimately far more telephone interviews than LVI interviews were achieved.

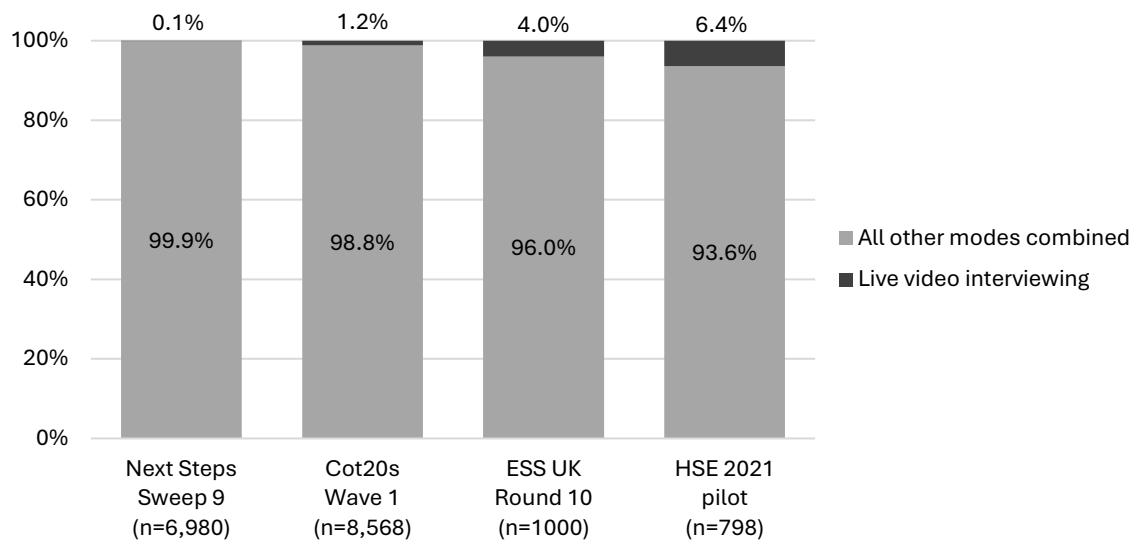
were not permitted. In the rest of the UK, an advance letter was followed by an in-person visit, and LVI was offered as an alternative mode to in-person interviewing. The final subsample size of respondents who participated in LVI was 55 (or 4.8%), and the rest of the sample were in-person participants (n=1,090).

- In the Health Survey for England pilot, the fieldwork agency responded to the pandemic-related pause to interviewing by providing remote options for sample members to participate. For this pilot in early-2021 (January-March)⁸, an opt-in approach was adopted for the survey, with sample members invited by letter to provide contact information via a portal. In total, only 51 individuals participated via LVI out of 798 (6.4%). (For more information see Appendix A.)

The results presented in Figure 2 show that proportions of respondents who ultimately participated via LVI are quite low in all studies that either encouraged responding via in-person interviewing, i.e., offered LVI as an option but did not encourage uptake via this mode, or allowed LVI only in case of nonresponse to in-person interviewing. The lowest proportion of respondents participating via LVI can be observed for Next Steps (0.1%) and the largest proportion of LVI participants can be reported for HSE 2021 pilot (6.4%).

⁸ Following the successful implementation of LVI in a pilot for BCS70, an approach was piloted that gave sample members the choice of conducting an interview remotely by telephone or video. Nevertheless, due to a relatively low take-up and the availability of other remote approaches in HSE, LVI was not subsequently used on the main stage of the survey in 2021.

Figure 2: Survey mode in the studies with LVI as a supplementary survey mode, share of LVI interviews.



4.2 Analysis of socio-demographic composition of LVI samples

For the analysis of the profile of respondents, who participated via LVI, we focus on the surveys with a sufficient sample size only. These are the surveys in which LVI was used as the first mode of issue for a substantial proportion of the whole cohort, i.e., NCDS, BCS70, and ELSA sweeps/waves. We compare the composition of subsamples of respondents (i) who participated via LVI to those (ii) who participated via in-person interviewing (including telephone in ELSA), regardless of the data collection stage and whether they were initially issued to in-person interviewing or LVI.

The sample for the NCDS analysis comprises those sample members who took part in the mainstage who were not issued before COVID (n=7,649). The sample for the BCS70 analysis comprises those respondents who took part in the mainstage and so excludes soft launch and pilots (n=10,824). Data on the subsamples are missing for a small proportion of respondents. The analysis encompasses the following variables that were

available in the studies: sex, highest qualification/education, economic activity and age⁹.

The results are presented in Figure 3 below.

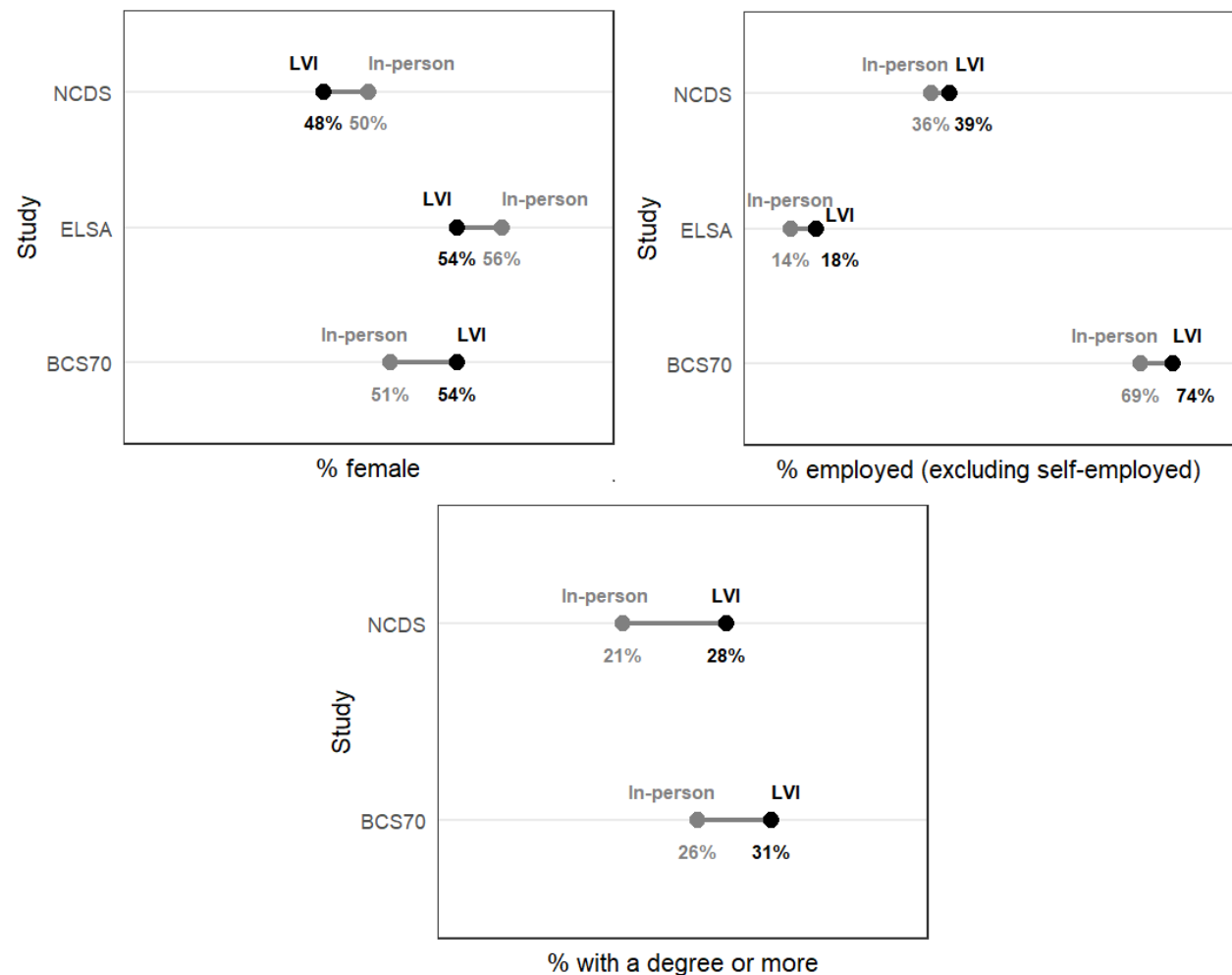
Sex. The analysis revealed minor differences in the proportion of women and men who participated via LVI and in-person in NCDS Age 65 Sweep and in ELSA Wave 10 (including telephone). However, more women participated via LVI (54%) than in-person (51%) in BCS70 Age 53 Sweep, with statistically significant differences ($p=0.040$, $\Phi=0.026$).

Economic activity. On the other hand, there are observable differences between the modes in the economic activity profile in all three studies. First, we can identify differences in the proportions of **employed** (excluding self-employed) between LVI and in-person interviewing in BCS70 Age 53 Sweep and ELSA Wave 10, but not in NCDS Age 65 Sweep. The proportions of employed people in the LVI subsamples were larger compared to in-person interviewing subsamples in both BCS70 (LVI=74%, in-person=69%, $p<0.001$, $\Phi=0.055$) and ELSA (LVI=18%, in-person=14%, $p=0.004$, $\Phi=0.043$). Additionally, a further analysis of the non-employed group presented in Table B2 in Appendix B showed that a smaller proportion of **long-term sick/disabled** persons participated via LVI than via in-person interviewing in both NCDS (LVI=4%, in-person=8%, $p<0.001$, $\Phi=0.069$) and BCS70 (LVI=2%, in-person=5%, $p<0.001$, $\Phi=0.082$). Also, there was a difference in the proportions of **retirees** between the visual modes in ELSA Wave 10, with retired participants constituting 70% of LVI participants and 75% of in-person interviewing participants ($p=0.001$, $\Phi=0.047$). No such statistically significant differences were observed for NCDS.

⁹ Since NCDS and BCS70 are birth cohort studies, the analysis of composition by age was relevant for ELSA subsamples only. In turn, information on the highest qualification was exclusively available for NCDS and BCS70 sweeps.

Highest qualification. Moreover, we observe notable and statistically significant differences in the composition by highest qualification in NCDS Age 65 and BCS70 Age 53 sweeps. In both studies, the LVI subsamples included more respondents with a degree (including higher degrees), with the gap being between 5% (BCS70 Age 53 Sweep, $p < 0.001$, $\Phi = 0.064$) and 7%-points (NCDS Age 65 Sweep, $p < 0.001$, $\Phi = 0.082$).

Figure 3: Socio-demographic differences between respondents who were interviewed in-person and via LVI in three studies (sex, economic activity, highest qualification) (NCDS, ELSA, BCS70).



Age. The distribution by age is relevant for ELSA only, since the other studies are, as explained previously, birth cohort studies. In ELSA, participant age ranges from 50 to 100. When grouped into 5-year age groups, the proportion of participants interviewed by LVI compared to in-person interviewing tended to be higher up until age 74, whereas from age 75 onwards there was a larger proportion of participants interviewed in-person compared to via LVI. In total, the proportions of those aged 50-74 were much larger in the LVI group compared to the in-person group (LVI=72%, in-person=58%, $p<0.001$, $\Phi=0.118$), as well as in comparison to the CATI group (LVI=72%, CATI=56%, $p=0.001$, $\Phi=0.101$). For more information, see Table B1 in Appendix B.

Comparing the Phi values as measures of the magnitude of associations, we can conclude that the most notable differences between LVI and in-person modes were observed in the age profile (ELSA), followed by highest qualification and the proportion of long-term sick/disabled. Other profile differences in economic activity, and especially differences in the proportions of men and women by mode, were less pronounced.

4.3 Analysis of response to complex elements via LVI

The analysis of the collection of complex elements also focusses on the three studies with a sufficient sample size of participants via LVI, namely NCDS, BCS70 and ELSA. In this context, this type of survey data refers to survey instruments tailored for collecting data on specific topics traditionally acquired via in-person interviewing in the analysed longitudinal studies. As previously noted, the complexity of collecting such data stems from their specificity, including factors like sensitivity, privacy, and the distinct advantages attributed to interviewer presence. These make their collection potentially more challenging when applying other survey modes that are either self-administered

(e.g., Web in Next Steps) or the interviewer is not physically present (e.g., LVI), which can negatively affect different rates. Therefore, we analyse and present results for

- (1) data linkage consent rates,
- (2) completion of a series of cognitive assessments, and
- (3) completion of the 'self-completion' section of the interview which contains the most sensitive questions in NCDS, BCS70, and ELSA.

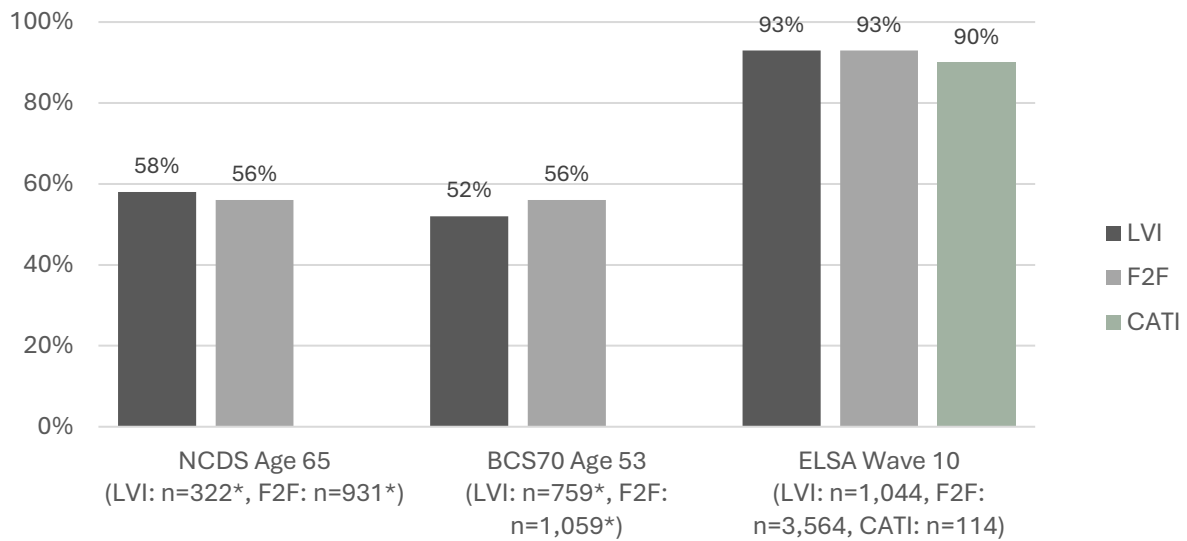
It is of note that not all investigated surveys included the same complex elements or tasks, and more detail is provided below. Chi-Square testing was conducted to confirm statistically significant differences between the modes.

Consent rates. In the analysed surveys, respondents were asked for data linkage consent to different data sources, namely (1) the Department for Work and Pensions data, (2) the National Health Service data¹⁰ and (3) His Majesty's Revenue and Customs data. In Figure 4, we show the effect of mode on data linkage consent rates in the investigated longitudinal surveys, and average rates are presented.

The results highlight substantial differences in average consent rates between the studies, with ELSA exhibiting the highest consent rates (90% or higher), while NCDS and BCS70 show much lower consent rates (between 52% and 58%). The differences in consent rates between the studies can be explained by the previously mentioned fact that in the NCDS and BCS70 sweeps, only respondents who had not previously given consent (either by refusal or non-participation in the sweep) were (re)asked for data linkage consent.

¹⁰ In ELSA, respondents were asked for consent to link their survey data to the following health data sources: Mortality, Hospital Episode Statistics and Primary Care data. They were also asked to agree to wear an activity monitor.

Figure 4: Average data linkage consent rates in NCDS, BCS70 and ELSA by survey mode



* In NCDS Age 65 and BCS70 Age 53 sweeps, only respondents who did not give consent in a previous sweep were asked for consent to data linkage. The numbers of participants asked to give consent differed slightly between different data sources for linkage.

Additionally, statistically significant differences in consent rates can be observed between LVI (52%) and in-person interviewing (56%) in BCS70, and between LVI and in-person interviewing (both 93%) and CATI (90%) in ELSA. However, no differences are identified between in-person interviewing and LVI in either NCDS or ELSA.

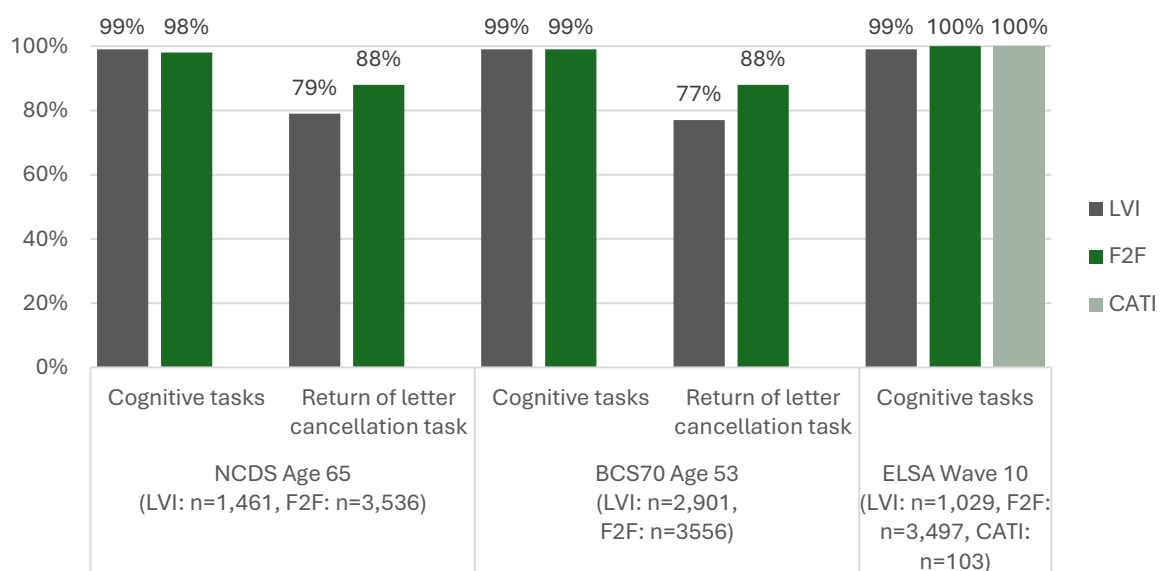
Cognitive assessments. We also investigate completion rates for cognitive test documents in the three surveys. The following tests are included: (1) Immediate word list recall test, (2) Delayed word list recall test, (3) Animal naming and (4) Letter cancellation. Due to similarities and differences in how the tests were administered, namely that the first three were scored by the interviewer during the interview, we combine them into ‘cognitive tasks’. The Letter cancellation task¹¹, on the other hand, was self-completed

¹¹ In the letter cancellation task, participants are presented with a grid or sheet of letters arranged in random order. They are instructed to scan the grid and mark/cancel out a specific target letter. Performance on the letter cancellation task is typically measured in terms of accuracy and speed.

on a paper sheet during the LVI interview by respondents and returned by post after the interview. The key distinction between LVI and in-person self-completion of this assessment is that the document would be given to and collected by the interviewer during the in-person interview.

The results, presented in Figure 5, compare the proportions of all respondents who completed and returned tests between the LVI and in-person modes in NCDS and BCS70, as well as LVI, in-person and CATI modes in ELSA¹². The results demonstrate very high and comparable completion rates for cognitive tasks across all three surveys and modes. However, as expected, the return rates for Letter cancellation task were lower in the LVI groups compared to in-person administration in both NCDS (LVI: 79%, in-person: 88%) and BCS70 (LVI: 77%, 88%), with the differences being statistically significant.

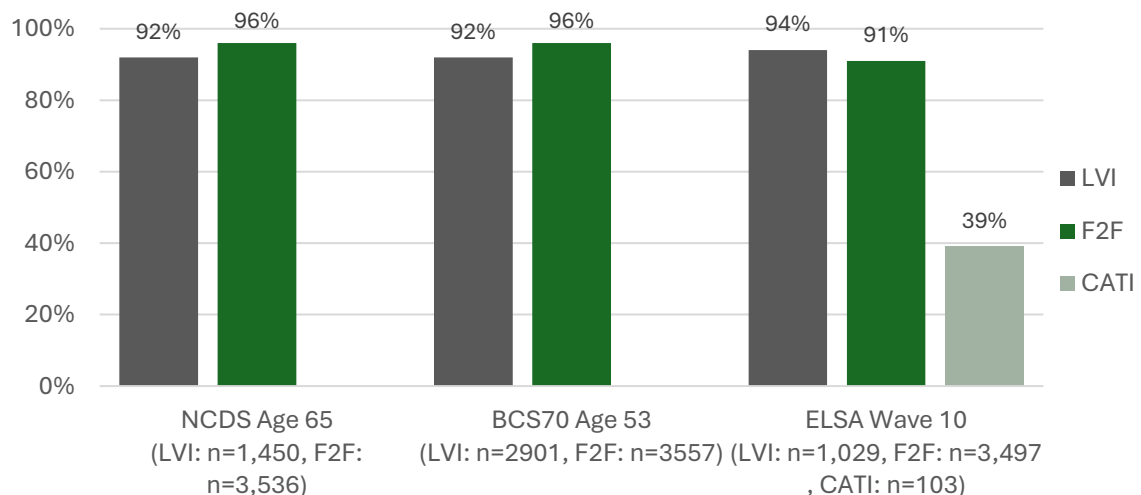
Figure 5: Return rates of cognitive test documents by mode



¹² No Letter cancellation test was included in ELSA.

Sensitive questions. Finally, we examine rates of completion of the sensitive self-completion module in the three surveys. The results, presented in Figure 6, compare the proportions of all respondents who completed the section with sensitive questions between the modes, LVI and in-person interviewing, in NCDS, BCS70 and ELSA (including CATI). In the in-person interviews, this section was completed by handing the laptop to the respondent to complete (i.e. CASI), whereas in LVI interviews it was either completed on the web (i.e. CAWI) during or after the interview or the interviewer read out the questions.

Figure 6: Sensitive question self-completion rates by survey mode



The results show very high self-completion rates and relatively minor, but statistically significant differences between the modes in all three surveys. In NCDS and BCS70, self-completion rates were higher in the in-person group (LVI: 92%, in-person: 96%), and in ELSA, they were higher in the LVI group (LVI: 94%, in-person: 91%, and very low in the CATI

group: 39%¹³). That being said, the LVI protocol was adjusted after the pilots by adding screen sharing as a measure to increase sensitive question self-completion rates. Further analysis reveals that the proportion of respondents who completed the sensitive question section via LVI increased from 80% (NCDS) and 77% (BCS70) in the pilots to 92% in the main waves of both longitudinal studies. These increases result from a decline in the proportions of respondents from both studies who confirmed they were willing to complete the section after the interview but later failed to do so.

5. Discussion and conclusions

This article contributes to the existing literature (e.g., Conrad et al., 2023; Endres et al., 2023; Schober et al., 2023; West et al., 2022) by collating evidence on the use of LVI from seven social surveys in the UK and presenting key findings on response rates, sample composition, and from the collection of complex elements via LVI. Notably, the purpose of this study was not limited to evaluating the data collected via LVI during and immediately after the pandemic. We use empirical evidence from multiple social surveys to discuss under what conditions LVI could be used in the future, either as a primary survey mode or as a supplement to more traditional survey modes, including in-person interviewing, telephone, and web. The main findings and conclusions are:

1. **LVI designs:** One of the main findings of our review and analysis was that different studies conducted in the UK used LVI in various ways and with different objectives in mind. First, it has been used as *the only (or first/primary) survey mode* when in-person

¹³ It is of note that CATI interviews were conducted at the end of the fieldwork. The final stages typically involve respondents who are less likely to cooperate with requests and tend to have higher levels of item nonresponse.

data collection was not possible in the initial stages of the pandemic (e.g., in BCS70). Under those circumstances, LVI acted as a substitute for in-person interviewing and made data collection possible without compromising much measurement equivalence (see Endres et al., 2023), which tends to be even more important in longitudinal surveys. Second, LVI was used in mixed-mode designs as *an alternative or complementary mode*. In some cases, large subsamples of respondents were issued first to LVI with in-person interviewing as a follow-up mode (e.g., in NCDS), which had notable cost implications since there was no need for survey interviewers to travel to respondents' residences (see Conrad et al., 2023). In other cases, smaller subsamples were issued to LVI in geographic areas where there were no in-person interviewers present (e.g., Northern Ireland in ESS UK), which means that LVI offered greater coverage. Third, LVI was used as *a response maximisation approach* in mixed-mode designs; it was either given as an option to attract those who were reluctant to be interviewed in-person (e.g., in ELSA) or not suggested until respondents refused to participate via the primary mode(s) (e.g., in Next Steps). This wide range of applications in the reviewed studies demonstrates how LVI could be integrated in survey research designs to achieve various data collection objectives. Nevertheless, LVI does not come without notable challenges which are described in more detail below using the evidence from our study.

2. **LVI uptake:** The first challenge is that *response rates in both cross-sectional and longitudinal studies analysed here are generally lower for LVI than other modes*, consistent with the previous literature (Conrad et al., 2023; Guggenheim & Howell, 2021; Phillips et al., 2023). These findings apply to both data collection designs in which respondents were issued to LVI (primary mode), as well as to those in which LVI

is given as one of the possible survey modes. The reasons for the lower LVI uptake may be manifold. In NCDS, BCS70 and ELSA, the proportion of respondents who were issued to and participated via in-person interviewing was larger than the proportion of respondents who were issued to LVI and participated via that mode. Similarly, the proportion of those who switched from LVI (issued to) to in-person interviewing (participated in) was much larger than those who switched from in-person interviewing to LVI. Additionally, the LVI-issued subsample from ELSA was as likely to participate via in-person interviewing as LVI, despite being asked to participate via LVI before being offered an alternative mode (although not pushed hard by the agency to participate in LVI given the respondents older age group). The uptake of LVI appears to decrease with age, as the participants in the ELSA Wave 10 cohort were, on average, about 19 years older than those in the BCS70 cohort and 7 years older than those in the NCDS cohort. This generally lower uptake of LVI may be in part attributed to the fact that panel members become more familiar with a particular mode through repeated participation across multiple sweeps or waves (in this case in-person interviewing), as previously discussed for studies conducted in online panels (Conrad et al., 2023; Phillips et al., 2023). Another factor is that for some of the cohort studies here, participants belong to an older age group, where we would expect lower uptake of LVI due to technical concerns. Furthermore, in ESS as a cross-sectional study, LVI was offered as an equal option to in-person interviewing in certain stages, but video interviews represented only a fraction of all interviews conducted in the UK. Even in countries included in the ESS with the largest LVI uptake, such as Iceland (see Thorolfsson et al., 2023), respondents were more likely to choose the in-person option. From this evidence, including findings from the Next Steps and Cot20s

studies, it may be concluded that in mixed-mode studies, respondents may be more likely to choose an alternative mode to which they are more accustomed over LVI (which might change over time). Uptake will also relate to what is most convenient in the moment and if an interviewer is present at the doorstep, respondents may well take up that opportunity. The collated evidence suggests that if LVI were the only data collection mode, response rates would be notably lower than in alternative modes. The issue could be explained, for example, by connectivity and technical problems, distance-related issues, privacy and security concerns, as well as other challenges associated with LVI (Kunz et al., 2023; Schober et al., 2020; Van Zeeland et al., 2021), some of which of course could be addressed over time. Another factor influencing uptake to LVI, although not further explored here, are interviewer effects. Based on the information we have at present from the survey agencies, such as on the preferences of interviewers to work with LVI (e.g., on Next Steps and Cots20) and the training of interviewers (either all interviewers were trained to work with LVI or only a subgroup), it is feasible that interviewers may have a sizeable effect on influencing respondents' uptake to LVI. Whilst respondents may prefer at present other modes to LVI, it seems that they can be persuaded to carry out an LVI interview with a suitably motivated interviewer. The influence of interviewers certainly needs further exploration. All issues highlighted above indicate that further development of fieldwork procedures is required for LVI to be considered as an equivalent or supplementary mode to more traditional modes, especially in prominent survey programs and studies.

3. Nonresponse bias: Another challenge is that the observed lower response rates in LVI could lead to an increase in *representation bias* if unit nonresponse was differential due

to various factors associated with the specifics of the mode. Our study offers some evidence that this could be the case, which is consistent with previous research on the topic (Conrad et al., 2023; Dulaney et al., 2023; Guggenheim & Howell, 2021; Martin & Fradier, 2023; Phillips et al., 2023). Our results suggest that those who are more educated, employed and to a lesser extent women may be generally more likely to participate via LVI, whereas long-term sick/disabled individuals and older people might be less likely. These findings are based on a comparison of the final composition of the in-person-administered and LVI-administered subsamples, while considering that respondents could have been LVI-issued but responded via in-person interviewing (and vice versa). We conclude that in a longitudinal study context, switching from in-person interviewing to LVI for the whole or a larger part of the sample could not only result in an increased loss of sample units but also in differential attrition, meaning that the proportion of already underrepresented and/or smaller subpopulations (e.g., those with chronic conditions) would decrease. This could lead to a limitation in studying certain groups due to an increased loss of statistical power over time associated with the newly introduced survey mode, LVI. Another factor to consider is that people with certain characteristics, such as those with technical difficulties and inabilities, do not take part in LVI to start with. However, as we are advocating later, in a multi-mode approach, where LVI is one of the options, nonresponse bias may be much less of an issue.

4. Collection of complex elements: Promisingly, the analysis of data linkage consent rates, completion and return rates for cognitive assessments, and completion rates to sensitive questions showed that LVI is *similarly suitable for collecting complex elements* as the in-person mode, with minor differences in favour of the in-person interviewer-administered mode. The evidence on comparable consent rates is similar

to that reported by Thornby et al. (2018), in contrast to studies that found higher data linkage consent rates in in-person than in telephone surveys (Al Baghal et al., 2020; Sakshaug et al., 2012). Furthermore, the analysis on the completion of sensitive information questionnaire sections produced similar findings. Compared to in-person interviewing, self-completion rates via LVI were slightly higher in one study (i.e., ELSA) and slightly lower in the other two studies (i.e., NCDS and BCS70), while previous research (Sun et al., 2021; West et al., 2022) reported similar item nonresponse rates in LVI and in-person interviewing. It is believed that social desirability is less of an issue in longitudinal studies that traditionally used in-person interviewing and later introduced LVI, due to their comparability (Endres et al., 2023), which is promising for longitudinal studies that transitioned from single-mode to mixed-mode designs. The only notable exception identified in our study are tasks that are self-completed as a paper sheet during the LVI interview and returned by post after the interview; completion and return rates for the letter cancellation task were about 10%-points higher via in-person interviewing than LVI. Overall, while we identified differences in response and subsample composition between LVI and in-person interviewing, we also determined that after respondents agree to participate via LVI, this mode proved to be a suitable alternative for conducting complex elements. The differences in response between the interviewer-administered modes appear to be more pronounced at the unit level than at the item level.

- 5. *Limitations:*** We also identify certain *limitations* of this study. While we investigated various differences between LVI and other modes, with a focus on comparing LVI to in-person interviewing, none of the included surveys used experimental designs. Thus, we could not fully disentangle the effects of mode from the effects of the

composition of samples that were self-selected or nonrandomly assigned and issued to a particular mode. Therefore, most of our findings on the differences between LVI and in-person interviewing are indicative, and further investigation is required. Besides testing for the effect of introducing LVI on response, sample composition, and *complex elements* collection with an experimental design in a multi-mode approach, another important question that could be addressed is how LVI performs in a single-mode survey design. Ideally, these findings would be related to the cost of data collection to evaluate the trade-off between saving on expenses associated with travel (see Conrad et al., 2023) and facing higher levels of differential nonresponse or attrition, as well as any measurement inequivalence.

- 6. Feasibility of LVI in longitudinal surveys:** Overall, the collated evidence from this study on unit nonresponse, sample composition, and complex elements collection suggests that LVI is a potential complementary mode to in-person interviewing in longitudinal studies and a feasible option for future data collection. LVI and in-person interviewing share many similarities meaning minimal mode adaptations are required to introduce LVI and the mode provides an ability to establish rapport with respondents and maintain their engagement. The collection of complex data is common practice in longitudinal studies and, as noted above, evidence presented here suggests LVI performs well. This is an important finding since previous research identified limitations in collecting complex elements via modes other than in-person interviewing (e.g., Jäckle et al., 2022; Ofstedal et al., 2021 - using self-completion modes). However, we also showed that LVI should not be treated as a perfect substitute for in-person interviewing from both unit and item nonresponse, as well as *complex elements* collection perspectives (including the collection of biomeasures

which we did not cover in this study). Importantly, LVI showed to be more suitable in a mixed-mode design with survey participants being issued to both LVI and in-person interviewing, with an ability to be interviewed via the mode they were not initially asked to respond in. This would mitigate the issues associated with LVI that were identified in this study, while offering more cost-efficient fieldwork. On the other hand, and based on our findings, LVI proved to be more of a *response maximization approach* in cross-sectional surveys than an adequate replacement for any ‘traditional’ survey mode, including in-person interviewing. The availability of contact details in longitudinal studies, including telephone numbers and email addresses, makes LVI generally more suitable here than in cross-sectional studies. Another main issue in cross-sectional studies, compared to longitudinal studies, is the lack of a prior relationship with sample members, as well as the first contact with potential respondents being by a different mode than LVI. The evidence from the cross-national comparative survey ESS suggests that more respondents could be persuaded to participate via LVI if the first contact was made by phone and not as an in-person visit (Thorolfsson et al., 2023).

Whilst the above analysis has identified several current challenges in the use of LVI - with regards to take up and sample composition - there are also promising results for using LVI in a mixed-mode survey design, for the collection of complex elements and for the feasibility in longitudinal surveys. We argue that, besides finding advanced technical and better methodological solutions for LVI interviewing (e.g., tailor-designed software such as CAVIsio (Martin & Fradier, 2023) and more suitable use of virtual showcards), LVI will have to become more widely accepted and recognized as a convenient survey mode by the respondents (and interviewers) over time. This could lead to an increase in LVI uptake

in both longitudinal and cross-sectional surveys, higher response rates, and the inclusion of certain demographics that are currently less likely to take part via LVI than other modes.

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Appendix A

Table A1: Mixed-mode data collection in NCDS Age 65 Sweep, BCS70 Age 53 Sweep and ELSA Wave 10

Study	Stage ^a	Data collection period	Issued to LVI	Issued to in-
NCDS Age 65 Sweep	1. Video-only pilot	Spring 2021	n=311	n=0
	2. Video-first main stage waves	October 2021 – summer 2022	n=1,777 ^b	n=0
	3. Predominantly in-person-first	Spring 2022 – November 2023	n=1,002 ^c	n=4,559
BCS70 Age 53 Sweep	1. Video-only pilot	Autumn 2020	n=60	n=0
	2. Video-first soft launch	Summer 2021	n=1,067	n=0
	3. Video-first main stage waves	October 2021 – early 2022	n=5,269 ^b	n=0
	4. Predominantly in-person-first	Spring 2022 – November 2023	n=894 ^c	n=4,661
ELSA Wave 10	1. Video-only pilot	May-June 2021	n=317	n=0
	2. Video-first main stage waves	October 2021 – early 2022	n= 2,881	n=1,115
	3. Predominantly in-person-first	February 2022 – March 2023	n=3,523	n=426

^a the evidence presented in this article is based on all NCDS stages, BCS70 stages 3-4 and ELSA stages 2-3.

^b This excludes cases who were originally issued to in-person interviewing before COVID and then issued to LVI later. It includes 192 (NCDS) and 419 (BCS70) cases that were deemed ineligible for LVI due to the absence of a telephone number or email address and were issued to an in-person interviewer later.

^c They were due to be issued to an in-person interviewer first but had to be issued to LVI first as there was no interviewer available.

Additional information about the specifics of LVI fieldwork (LVI first mode of issue)

In addition to the stages described in Table A1, the NCDS fieldwork operation in these periods also included cases that had been issued to in-person interviewers before the pandemic struck but where an interview had not been achieved by the time fieldwork was paused.

Further, there were cases that were initially earmarked for in-person visits following the restart of this approach, but that were switched to LVI due to a lack of available field interviewer resource in specific geographical locations, which was also the case for BCS70 and ELSA. This reflected a cross-sector fieldwork capacity problem at this time following the loss of interviewers from agencies' panels and a challenging labour market for recruitment. A strength of the LVI approach is that geographical restrictions do not apply.

The analysis in this study focuses on comparing the LVI-first approach with the in-person approach. To maintain comparability and provide a full understanding of non-response to LVI, the LVI-first groups in NCDS and BCS sweeps include a group of cases that were part of the sample earmarked for issue to LVI that could not be worked in that mode due to an absence of telephone numbers and email addresses.

Additional information about the HSE pilot

The sample frame for the HSE pilot contained no names or other contact information for selected households. In the first stage in January 2021, those who opted in and provided contact information were contacted by interviewers who gave the option of a LVI or a telephone interview. Of the initial sample of households (n=828), 24% opted in and interviews were achieved by one or other mode in 76% of these households. Of the individuals interviewed (n=237), 13% were conducted via video with the remainder by telephone. With the February and March samples, those opting in were asked to indicate whether they preferred a telephone or a video interview when opting in via the portal. Of the opt-in sample in these months (n=561) a smaller proportion opted for the video route with this approach (4%, n=21 interviews).

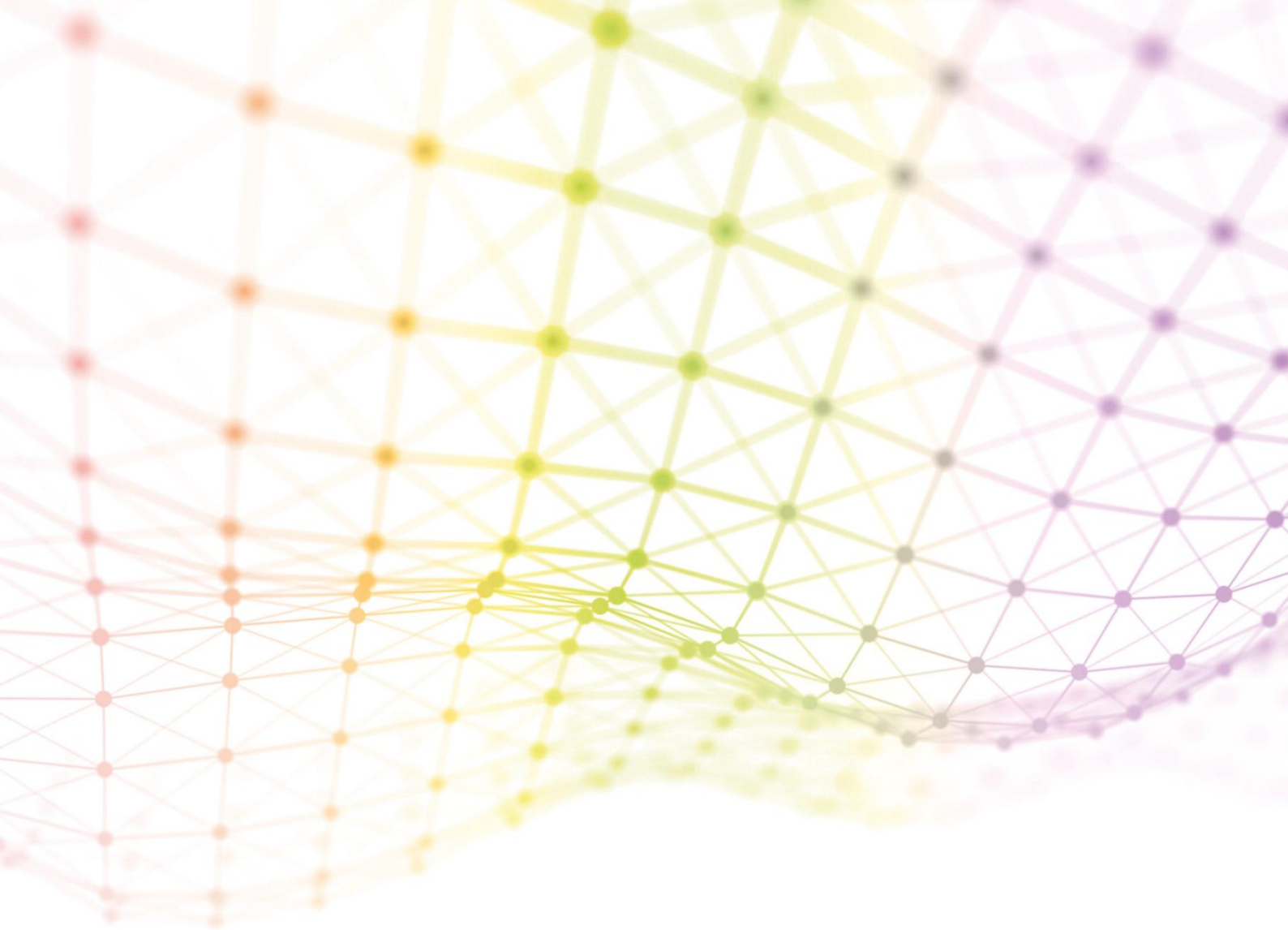
Appendix B

Table B1: Age distribution of ELSA participants by survey mode.

Age group	LVI (n=1,055)	In-person (n=3,609)	CATI (n=114)
	%	%	%
50-54	3.1%	1.7%	0.0%
55-59	13.4%	10.8%	14.9%
60-64	8.5%	7.4%	6.1%
66-69	22.7%	17.5%	14.0%
70-74	24.0%	20.6%	21.1%
75-79	16.2%	19.0%	14.0%
80-84	8.4%	11.9%	17.5%
85-89	2.8%	8.4%	7.9%
90+	0.7%	2.6%	2.6%
Missing	0.3%	0.1%	1.8%
Total	100.0%	100.0%	100.0%

Table B2: Economic activity distribution by survey mode in NCDS, BCS and ELSA.

Economic activity	NCDS		BCS70		ELSA		
	LVI (n=1,453)	In-person (n=3,487)	LVI (n=2,794)	In-person (n=2,964)	LVI (n=1,055)	In-person (n=3,609)	CATI (n=114)
	%	%	%	%	%	%	%
Employed	38.9%	36.4%	73.6%	68.6%	18.1%	14.4%	16.7%
Self-employed	15.3%	12.3%	16.7%	16.1%	5.7%	4.7%	6.1%
Unemployed	1.2%	1.8%	0.9%	1.6%	0.7%	0.6%	0.9%
Permanently sick or	4.5%	8.4%	2.2%	5.4%	1.4%	2.5%	2.6%
Looking after home or	7.4%	6.9%	4.4%	4.8%	2.8%	1.8%	0.0%
Retired	30.5%	31.9%	1.0%	1.1%	69.8%	74.8%	71.9%
Other	2.1%	2.3%	1.2%	2.5%	1.5%	1.2%	1.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%



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