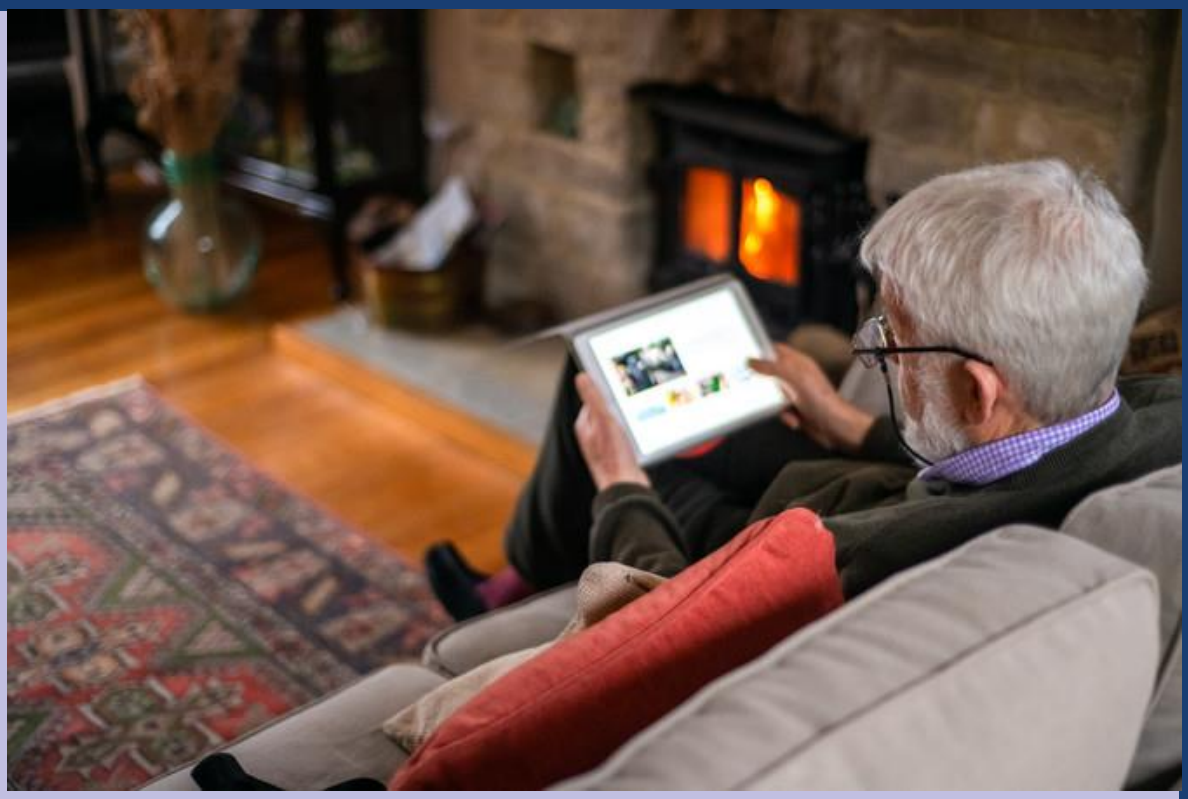
NIHR | Policy Research Unit Older People and Frailty



Digitalisation of health and care services for older adults; what can we learn from the COVID-19 pandemic

Charlotte Eost-Telling, Alex Hall, Fiona Beyer, Ukachukwu Abaraogu, Oleta Williams, Claire H Eastaugh, Patience Kunonga, Dawn Craig, Barbara Hanratty, Peter Bower, Jane McDermott, Chris Todd

Full Report

March 2023

Digitalisation of health and care services for older adults; what can we learn from the COVID-19 pandemic

Full Report

Charlotte Eost-Telling[1], Alex Hall[1], Fiona Beyer[2], Ukachukwu Abaraogu[1], Oleta Williams[2], Claire H Eastaugh[2], Patience Kunonga[2], Dawn Craig[2], Barbara Hanratty[2], Peter Bower[1], Jane McDermott[1], Chris Todd[1]

NIHR Older People and Frailty Policy Research Unit

[1] National Institute for Health Research Older People and Frailty Policy Research Unit, School of Health Sciences, Faculty of Biology, Medicine and Health, The University of Manchester, Manchester.

[2] National Institute for Health Research Older People and Frailty Policy Research Unit, Population Health Sciences Institute, Newcastle University, Newcastle upon Tyne.

6th March 2023

This report presents independent research funded by the National Institute for Health and Care Research (NIHR) Policy Research Unit in Older People and Frailty. The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

Policy Research Unit Programme Reference Number PR-PRU-1217-21502

Contents

Background

For at least a decade, the World Health Organization (WHO) has been encouraging use of digital technology to improve health and care services[1], and digitalisation of services is a key driver in the NHS [2-4]. There is a growing role for digital technologies in society, but also concerns that older adults are being disadvantaged and excluded with the growth of use of these technologies[5]. The WHO declared the COVID-19 outbreak as a global pandemic on 11 March 2020. and this led governments worldwide to mandate lockdowns and social restrictions[6]. Both in UK and internationally this was accompanied by rapid implementation of many digital services[7]. However, a number of recent reports suggest that inequalities have widened due to the pandemic, at least in part driven by the digital divide[8-12].

A recent Older People and Frailty Policy Research Unit (OPFPRU) review synthesised evidence on the impact of digital technologies on older adults' (age 65+) access to health and care services[13]. This review concluded that the evidence was unclear: overall, it was low-quality, focused on remote delivery of care, did not include social care, and there was a lack of evidence for technologies to facilitate older adults' access to services. This does not align well with NHS 'Empower the Person' Roadmap for Digital Health and Care Services[14]. The OPFPRU evidence synthesis included evidence published up until early 2020, i.e., prior to the onset of the pandemic. Since then, the rapid expansion of digital service provision and interest in digital delivery arising because of the pandemic has been accompanied by an expansion of research literature exploring the impact of digitalisation of health and care services.

Exploration of this work will offer new opportunities to understand barriers, facilitators, and limitations of digital provision. Such services are likely to continue to play a part in service provision as we emerge from the 2020-22 COVID-19 pandemic and prepare for future health emergencies.

We therefore conducted a systematic mapping review of the new literature to characterise the current body of knowledge, identify key areas undergoing development and uncover gaps in the evidence. The findings will inform a longer-term ambition to advance our understanding of how health and care services have been digitalised since the beginning of the pandemic and the policy implications of this change to UK health and care services for older adults.

Box 1: Key terms and definitions used in this review

Equity	The World Health Organization defines equity as 'the absence of unfair, avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other dimensions of inequality (e.g. sex, gender, ethnicity, disability, or sexual orientation)'[15].
Equality	The Equality and Human Rights Commission defines equality as being 'about ensuring that every individual has an equal opportunity to make the most of their lives and talents'[16], i.e., providing the same services to all users
Digital health technology	Digital health technologies use computing platforms, connectivity, software, and sensors for health care and related uses. The broad scope of digital health includes categories such as mobile health (mHealth), health information technology (IT), wearable devices, telehealth and telemedicine, and personalised medicine[17].

Review aims and objectives

This review aimed to map the evidence base on the digitalisation of health and care services for older adults since the start of the first UK COVID-19 pandemic lockdown in March 2020 until May 2022, using the following question:

- What types of evidence are available/currently being sought on the digitalisation of health and care services/digital delivery of interventions or practice for older adults during[a] the COVID-19 pandemic?

The objectives of the review were to identify the following:

- The extent to which research has explored health inequities relating to the digitalisation of health and care services, applying the PROGRESS-Plus framework
- The specific health and care service areas, and technologies, that have been investigated
- The types of study that have been conducted, the types of data that have been collected and the outcomes (qualitative and quantitative) that have been investigated
- The global regions and countries where evidence is being sought with respect to the impact of digitalisation of health and care services for older adults
- The extent to which outcomes have been explored from service user, unpaid carer, or professional perspectives.

Methods

Based on our scoping work, the volume and nature of evidence on digitalisation, and the need to generate a useful review product for policy makers and our wider stakeholders, a systematic mapping review was selected as the most appropriate methodology. The suitability of the mapping review methodology was based on the diverse and diffuse evidence base and the need to 'collate, describe and catalogue available evidence relating to a topic or question of interest' [18]. The aim of a mapping review is to 'map out and categorize existing literature from which to inform policy, commission further reviews and/or primary research by identifying gaps in research literature'[19].

As the COVID-19 pandemic may have contributed to a widening of health inequities we aimed to map whether equity factors had been considered in the evidence base, using the PROGRESS-Plus framework[20] endorsed by the Cochrane / Campbell Equity Collaboration for use in systematic reviews. The PROGRESS-Plus acronym can be used to explore whether studies have collected and considered factors associated with inequity within their evidence and comprises; Place, Race / ethnicity, Occupation, Gender, Religion, Education, Socioeconomic factors, Social capital and Plus (which includes age and disabilities).

A protocol for this study was registered prospectively with the Open Science Framework (OSF) (registration DOI 10.17605/OSF.IO/ABJ87).

[a] We considered the period between March 2020, when the WHO declared COVID-19 a global pandemic, until the search completion in May 2022 (to include the most up-to-date relevant evidence). The UK Government lifted the majority of legal coronavirus (COVID-19) restrictions by March 2022.

Initial public consultation work

At the outset of the review, we consulted with members of the Greater Manchester Older People's Network (GMOPN)[21] health and social care board, to understand the experiences, concerns and research priorities of older people regarding digital health and care services during the pandemic. The board meets quarterly to discuss issues regarding health and care access within local communities, and the chair also sits on the GM Combined Authority Digital Taskforce Group. Consultation with this group helped us ensure we considered the views and priorities of less digitally engaged or enabled older people. The consultation took place using Zoom, as GMOPN meetings were virtual at the time.

We posed the following question to start a discussion on the digitalisation of services: *'Other than remote / digital GP consultations, have you had any experience of using digitalised / remote health or care services during the pandemic?'* Most of the group had experienced remote GP appointments, but experience of using other digital services was limited. One person had successfully used remote physiotherapy services. The group also had experience of using apps and online systems for booking COVID-19 appointments, but these had sometimes proved frustrating because there had been poor communication between the NHS booking system and GP surgeries booking systems. Although the members of this group were already digitally engaged, we did ask about any experiences relating to people who were less digitally able. One person had experience of trying to help a digitally excluded family member access online services, and how this had been difficult due to their sensory impairments and apprehension of technology. However, the group agreed that the digitalisation of health and care services was an important and timely area of research.

Search strategy and sources

Bibliographic databases

In collaboration with experienced information specialists, we conducted an initial limited search of SCOPUS, ASSIA (Applied Social Sciences Index and Abstracts, which covers health, social services, psychology, sociology, economics, politics, race relations and education) and Social Care Online using digitalisation and health and care terms, combined with example services. The search strategy from Scopus can be found in Appendix 1. The information specialists reviewed the title, abstract and index terms of the retrieved papers and combined them with other relevant terms from previous OPFPRU reviews[13, 22] to develop the final search strategy. The WHO COVID-19[23] database was identified as the main source of evidence because it draws on records from other major databases such as MEDLINE to collate studies focusing on COVID-19. To ensure comparable coverage, test searches were conducted using samples from the WHO COVID-19, MEDLINE (OVID), ASSIA (ProQuest) and Social Care Online[24] database results. Results from the WHO database and MEDLINE were comparable, however, ASSIA and Social Care Online produced additional evidence not found in the WHO COVID-19 results and were therefore used to supplement the WHO COVID-19 searches. The search strategies are provided in Appendix 2.

Database searches were conducted between 5-10th May 2022. As this review aimed to map research exploring the digitalisation of health and care services for older adults arising because of the COVID-19 pandemic, searches were limited by date to 2020 onwards. Searches were also limited to work published in English.

Grey literature

A search of relevant UK websites and grey literature sources was undertaken between 20th June – 4th July 2022 using the same search terms as the database searches, with adaptations as appropriate to each of the sources. Grey literature sources included major UK national organisations (such as Age UK) that work with older people, service providers, and the websites of major UK research funders including NIHR, MRC, The Wellcome Trust and UKRI (including ESRC and EPSRC). See Appendix 3 for further details of all the grey literature searches, the implemented search strategies and the number of hits returned.

Eligibility criteria

Eligibility criteria guided by the PICOS (Population, Intervention, Comparator, Outcome, Study design) framework were applied to the selection of studies (see Table 1). For full inclusion and exclusion criteria, see Appendix 4.

Table 1: Eligibility criteria

Population	Studies with older adults aged ≥ 65, or mixed older/younger aged populations with a mean age of ≥ 65, or where ages were clearly demarcated, and we could extract data relating to older people separately.
Intervention	Any form of digitalised service, intervention or way of working that potentially directly affected patients/service users within health or care, that had been implemented or modified (e.g., an existing way of working that had been digitalised) during the COVID-19 pandemic. We included primary care and community-based health and care services and interventions. 'Services' are often variable and can be difficult to define; primary care services include general practice, community pharmacy and dentistry, while examples of community-based services include community physiotherapy, falls services and palliative care[25]. Community-based services may be delivered in a wide range of settings, including people's homes, long-term care settings and community centres. Studies of 'virtual inpatients' were included, i.e., those being treated at home, who may previously have been treated for their condition in hospital, e.g., hospital at home. Studies were excluded where participants were 'in-person inpatients' in hospital. We included studies with professional staff if they related to digitalisation of services with a patient interface. We excluded studies that related to the use of digitalisation solely within the workforce, e.g., technological developments in clinical testing, delivery of training to professionals, or intra-/inter-professional communication. Studies which mentioned COVID-19 in the final lines of the abstract or as a keyword, but in which COVID-19 is not an integral part of the study, were excluded.
Comparator	Any comparator, where relevant (see 'study design' below)—intervention studies may compare a digitalised intervention with usual practice pre-COVID-19; otherwise, no comparator.
Outcome	Papers reporting patient outcomes (clinical outcomes, quality of life); care utilisation and cost-effectiveness; staff or patient experience; barriers and facilitators to implementation of digital working and any theoretical interpretive lens.

Study design/ publication type	Evidence reviews (both systematic and narrative); primary studies (qualitative and quantitative). We included peer-reviewed literature, pre-prints (completed studies not yet peer-reviewed) and grey literature. Generic opinion/comment pieces were excluded. *Dates*: data collection of primary research (including primary research within any evidence reviews) must have occurred after the introduction of nationwide lockdowns related to COVID-19 (March 2020). We included studies where data collection started before March 2020 if the data collection period extended beyond March 2020. *Geographical location*: we included academic literature (peer-reviewed and pre-print) from any country. Study protocols, summaries of ongoing studies, and grey literature reports were included only from the UK.

Selection of sources

Identified records from the bibliographic databases were uploaded to Rayyan, an online platform for reviews[26], and screened for duplicates. Titles and abstracts were assessed against the eligibility criteria by two reviewers independently, with 5% of articles reviewed by both reviewers. Full texts of articles meeting the inclusion criteria were then assessed by two reviewers independently, with 10% reviewed by both reviewers. Disagreements were resolved through discussion.

Records identified through the grey literature searches were screened by one reviewer to select potentially eligible full text articles. A second reviewer then cross-checked the potentially eligible full text to determine the final eligibility of the article and ensure no duplication with the bibliographic database records.

Data extraction and presentation

Full texts which met the inclusion criteria were imported to EPPI-Reviewer[27]. One reviewer extracted the data from the texts using a predesigned tailored extraction tool, and 5% were independently reviewed by a second reviewer. Disagreements were resolved through discussion, or with an additional reviewer.

Table 2 shows the data extracted for the mapping exercise:

Table 2: Data extracted for mapping

Study characteristics	Year of publication, data source, geographical area of study
Population	Sample size, type of participants, PROGRESS-Plus[b] criteria[28]
Intervention	Type of service / intervention, the setting it is delivered/implemented in. Type of technology utilised
Comparator	Not recorded
Outcomes	Types of outcomes or impacts reported, i.e., utilisation, quantitative or qualitative experiences / perceptions and/ or health outcomes, types of data and evidence produced, NICE categorisation?

[b] PROGRESS-Plus is an acronym used to identify characteristics that stratify health opportunities and outcomes. PROGRESS refers to: Place of residence, Race/ethnicity/culture/language, Occupation, Gender/sex, Religion, Education, Socioeconomic status, Social capital, Plus refers to: 1) personal characteristics associated with discrimination (e.g. age, disability) 2) features of relationships (e.g. smoking parents, excluded from school 3) time-dependent relationships (e.g. leaving the hospital, respite care, other instances where a person may be temporarily at a disadvantage)

Data were visualised using EPPI-Mapper[29], a standalone software package, to display bubble or heat maps of knowledge clusters on relevant criteria. Literature was also summarised using a narrative synthesis. Limitations and biases of using a mapping review are discussed, and implications for policy presented.

Findings

Number of reviews identified

Searches of the databases identified 5139 unique records, and the grey literature search produced another 8782 unique records. After initial screening on title and abstract, 420 database records and 34 records from grey literature were included in full text screening. Within this evidence we identified five review papers, which we excluded because we were unable to extract unique data from the review. In order to include the evidence from these reviews, we screened the primary studies from each and where relevant added them to the evidence pool using the same inclusion criteria as the database records. In total, we identified 171 studies reporting digitalisation of services for older people during the COVID-19 pandemic, see Figure 1[30-200].

Excluded studies

Studies excluded at full text screening, together with reasons for exclusion, are shown in Figure 1. The primary reasons for exclusion were that study participants were not older people, or we could not clearly delineate participants aged 65+ years, the studies were not targeting health or care services, the outcomes were not related to digitalisation of health and care services, or the service had not changed as a result of the COVID-19 pandemic.

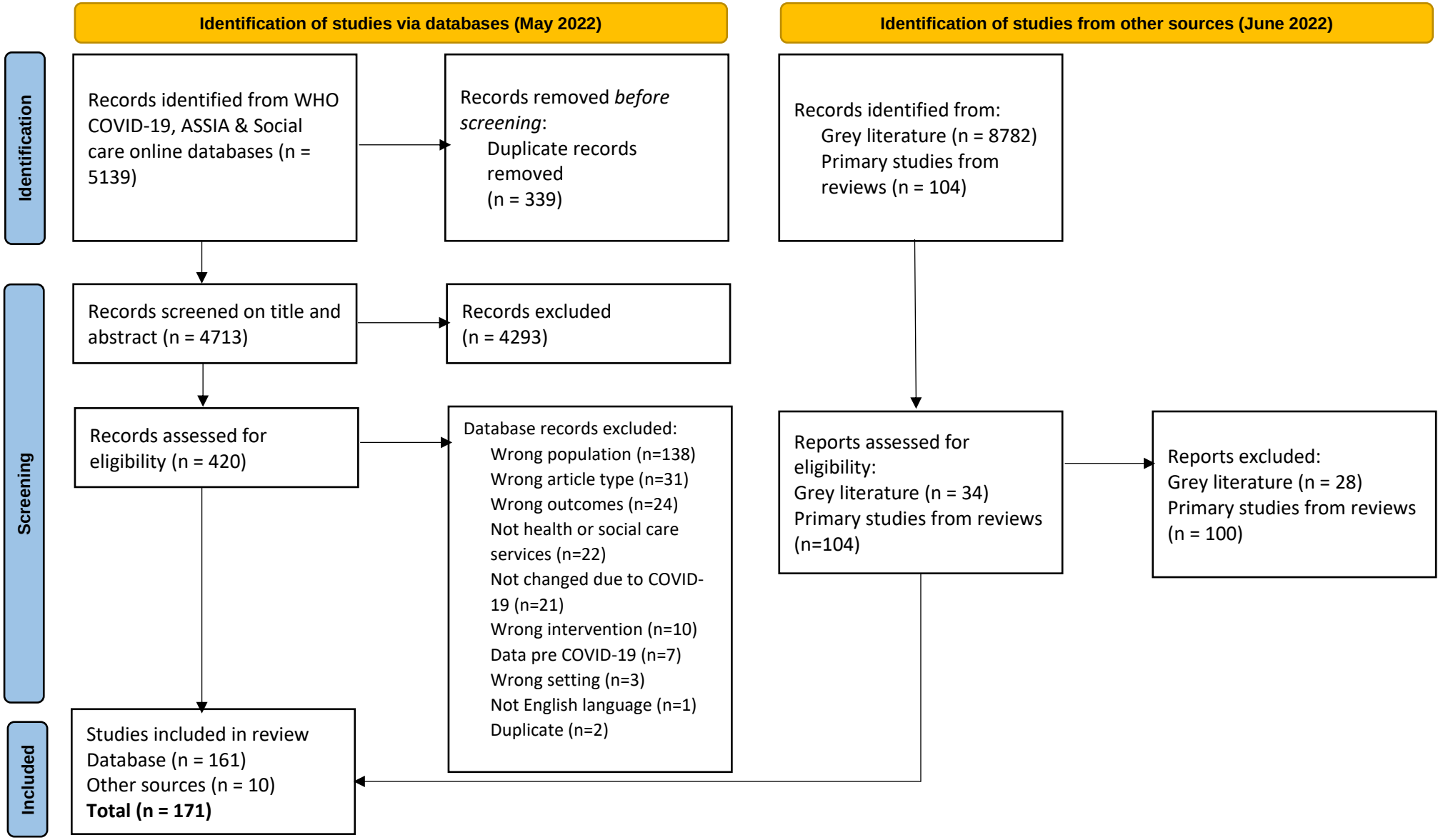


Figure 1: PRISMA flowchart

Study characteristics

Table 3 shows study characteristics of the included studies, focusing on year of publication, and source of data.

Table 3: Characteristics of included studies

Study Characteristic		Number of UK studies* (%)	Number of studies globally (excluding UK)* (%)
Year of publication	2020 (March onwards)	3 (13.0)	18 (12.2)
	2021	14 (60.9)	93 (62.8)
	2022 (to end May)	6 (26.1)	37 (25.0)
Source of data	Primary	20 (82.6)	93 (62.8)
	Secondary	4 (17.4)	56 (37.8)

Studies identified by year of publication

All included studies were published between 2020 and 2022, with the majority (62.8%, n=93 globally, and 60.9%, n=14 UK) being published in 2021.

Sources of data

Secondary data were used in 37.8% of studies globally (n=56), but only 17.4% of UK studies (n=4). Conversely 62.8% of global studies utilised primary data (n=93), compared to 82.6% of UK studies (n=20). One US study utilised both primary and secondary data.

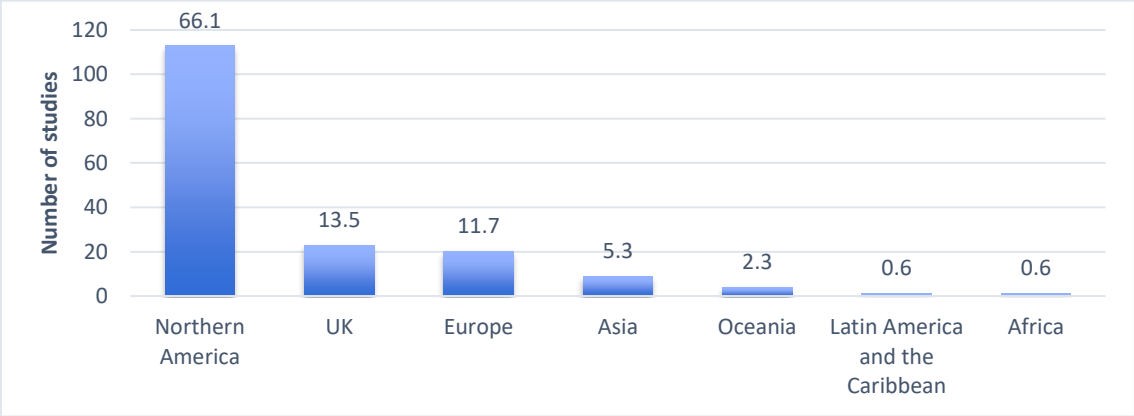


Figure 2: Geographical area of studies according to WHO classification [201]

Figure 2 shows that studies were drawn from 24 countries but were unevenly distributed, with North America (n=113, 66.1%) accounting for the majority. Twenty-three studies (13.5%) were identified in the UK and 20 (11.7%) were European studies. Figure 3 shows the distribution of included studies across the world.

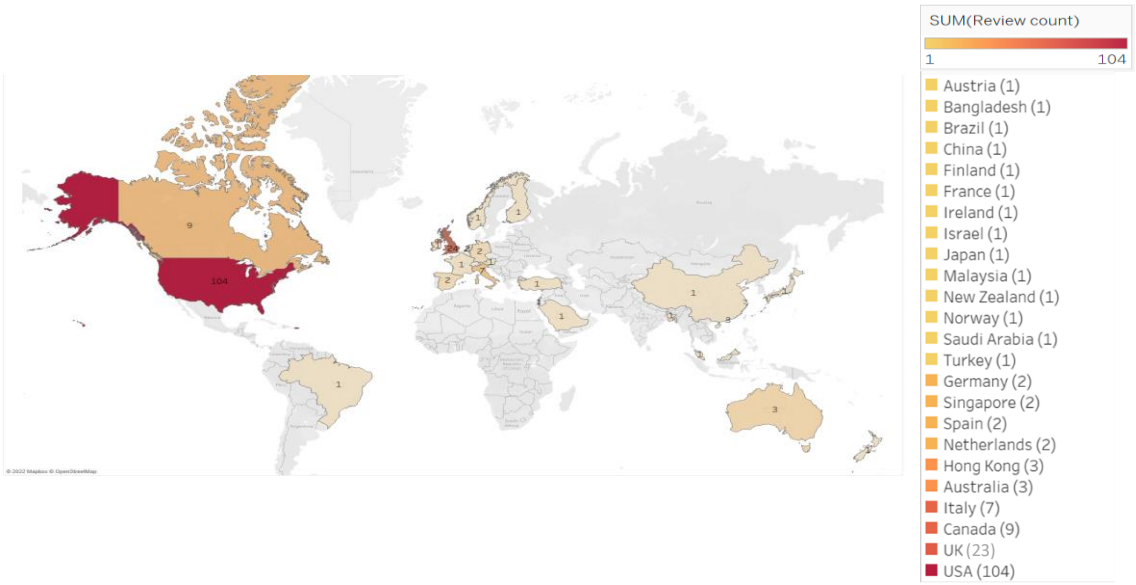


Figure 3: Countries where included studies took place

PROGRESS-Plus Framework for categorising equity characteristics

Collection of PROGRESS-Plus data

The PROGRESS-Plus framework was used to record inclusion of equity characteristics in included studies[28]. PROGRESS-Plus is an equity lens applied in the conduct, reporting, and use of research, helping to identify characteristics that can influence health opportunities and disparities[20]. PROGRESS-Plus: **P**lace of residence, **R**ace/ethnicity/culture/language, **O**ccupation, **G**ender/sex, **R**eligion, **E**ducation, **S**ocio-economic status, **S**ocial capital. **Plus** refers to other relevant characteristics: 1) personal characteristics associated with discrimination (e.g., age, disability), 2) features of relationships (e.g., smoking parents, excluded from school, 3) time-dependent relationships (e.g., leaving the hospital, respite care, other instances where a person may be temporarily at a disadvantage).

Table 4 shows the reporting of PROGRESS-Plus measures in the included studies.

Table 4: PROGRESS-Plus measures

n (%)	UK	Europe	Northern America	Africa	Asia	Latin America / Caribbean	Oceania	Total
Place of residence	3 (13.0)	5 (25.0)	34 (30.1)	0	3 (33.3)	0	0	45 (26.3)
Race/ethnicity / culture / language	8 (34.8)	2 (10.0)	73 (64.6)	0	2 (22.2)	0	0	85 (49.7)
Occupation	4 (17.4)	0	3 (2.7)	0	1 (11.1)	0	0	8 (4.7)
Gender	14 (60.9)	17 (85.0)	82 (72.6)	0	8 (88.9)	1 (100.0)	4 (100)	126 (73.7)
Religion	0	0	0	0	1 (11.1)	0	0	1 (0.6)
Education	5 (21.7)	8 (40.0)	21 (18.6)	0	8 (88.9)	0	2 (50.0)	44 (25.7)
Socio-economic status	4 (17.4)	2 (10.0)	11 (9.7)	0	1 (11.1)	0	1 (25.0)	19 (11.1)
Social capital	5 (21.7)	2 (10.0)	10 (8.8)	0	6 (66.7)	1 (100.0)	1 (25.0)	25 (14.6)
Personal characteristics associated with discrimination	23 (100)	20 (100)	113 (100)	1 (100)	9 (100)	1 (100)	4 (100)	171 (100)
Features of relationships	0	0	0	0	0	0	0	0
Time dependent relationships	0	0	1 (0.9)	0	0	1 (100.0)	0	2 (1.2)
None of the above	0	0	6 (5.3)	0	1 (11.1)	0	0	7 (4.1)
Total number of studies	23	20	113	1	9	1	4	171

Personal characteristics associated with discrimination were the most often collected data in both UK (n=23, 100%) and global studies (n=127, 85.8%) included in this review. This is in part because the measure includes age, and in accordance with our inclusion criteria all studies in the review included participants, or people who interacted with participants, over the age of 65 years. The second most included data related to gender (UK n=14, 60.9%, globally n=112, 75.7%). Information on race /ethnicity / culture/ language was noted in 85 out of the total 171 studies (49.7%) but its inclusion varies across countries, e.g., this measure was included in 64.6% of North American studies (n=73) but only 34.8% of UK studies (n=8).

Place of residence was recorded in 42 (28.4%) studies globally, and in three (13.0%) UK studies. Within PROGRESS-Plus this measure is used to indicate where participants live, i.e., in urban or rural areas and is not a record of the geographical location. Occupation i.e., type of job and / or employment status was recorded in twelve (8.1%) studies globally and four

(17.3%) in the UK. Education level of participants was included in 26.4% of studies globally (n=39) and in a slightly lower percentage of UK studies (n=5, 21.7%).

Socioeconomic status was recorded in 10.1% of studies globally (n=15), and in the UK this figure was higher at 16.7% (n=4). Related to this measure was the inclusion of income data in 13.5% of studies globally (n=20), although none in the UK, and medical insurance status in 24 studies (16.2%) (23 of which were in the US). Both these measures are likely indicators of SES, as the financial burden of health insurance means fewer with lower incomes can afford cover, and research indicates that those with state / no insurance can experience poorer levels of care[202].

Social capital was a difficult factor to assess, as there was no universal definition of the term although it is interrelated with SES [20]. Only one UK paper (4.3%) and two globally (1.4%) attempted to capture this factor directly, but a further 4 UK studies and 18 globally collected data which could feed into this aspect. It can be approached in many different ways, but if considered in terms of the dimensions, settings, and levels of social capital available a number of studies captured information which could feed into this factor[203]. Two studies globally (1.4%), and one in the UK (4.3%) collected data on levels of social support or size of social networks. Additionally, some studies collected data on whom people were living with (globally n=19, 12.8% and UK n=4, 17.4%), which could have a potentially positive or negative effect on building social capital.

'Plus' measures, apart from 'age' as part of the personal characteristics associated with discrimination and already described above, were not explicitly evidenced in many studies. However, related factors which could lead to discrimination were included in some studies: aspects of health which could be indirect indicators of disability included additional health conditions (globally n=8, 5.4% and UK n=1, 4.3%), smoking (globally n=2, 1.4% and UK n=0) and shielding status (all of which were UK studies n=3, 13.0%). None of the included studies collected data on participants' sexual orientation, or the impact this may have on access to and experiences of digitalised services [204]. The Cochrane guidance on 'Features of relationships' includes, e.g., 'parents who smoke' or 'exclusion from school'[28], but these measures were not relevant to the current review and future work to reconsider how this factor can be made more relevant to an older population would be helpful. Data on time dependent relationships, where a participant may be in a more vulnerable situation for a period of time, e.g., discharge from hospital, were collected in two studies. Neither of these were UK-focused.

Use of PROGRESS-Plus factors to stratify data

Despite all studies collecting data on at least one PROGRESS-Plus equity factor, many did not use the data to interpret their findings. Figure 4 shows the number of factors across which data was collected and used to stratify the findings in UK studies. Thirteen UK studies did not use any equity factors to stratify their data. Five studies used one factor, all of which were from the Plus category of the framework, three studies used two factors and one study each stratified on six and seven PROGRESS-Plus equity factors.

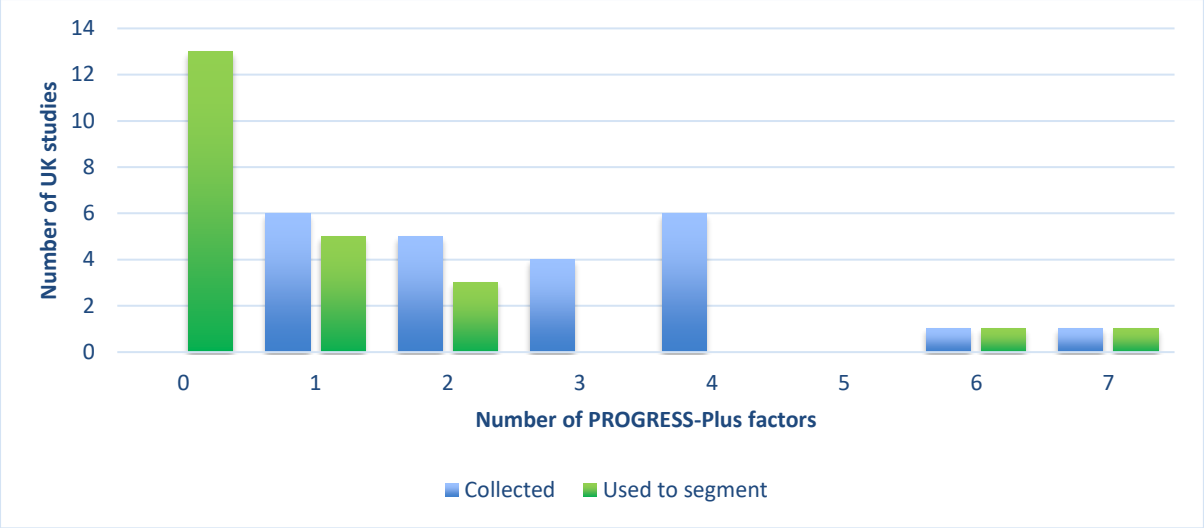


Figure 4: Collection and use of PROGRESS-Plus factors in UK studies

Table 5 shows how many studies collected information on each of the PROGRESS-Plus factors together with the number of studies which used the information to stratify and interpret study data.

Table 5: Collection and use of PROGRESS-Plus factors to segment data in UK studies

Equity factor	***Studies collecting this information***	***Studies using this to stratify data***
Place of residence, e.g., urban or rural	3 (13%)	0 (0%)
Race/ ethnicity/culture/language	8 (35%)	3 (13%)
Occupation (including employment status)	4 (17%)	2 (9%)
Gender/sex,	13 (57%)	3 (13%)
Religion/beliefs	0 (0%)	0 (0%)
Education	5 (22%)	2 (9%)
Socioeconomic status (including deprivation status)	5 (22%)	2 (9%)
Social capital (including who living with)	4 (17%)	2(9%)
Plus (other features associated with discrimination including age and disabilities)	23 (100%)	10 (43%)

The stratification factor used most often in the framework was the Plus factor with 10 UK studies segmenting their data using one or more of the Plus factors (all 10 used age, two also added aspects of mental health, three factored in disabilities, one included other health conditions and one shielding status). Three UK studies employed Race/ethnicity/culture/language to segment study data, and for one study it was the only factor considered. Two papers used Occupation/employment status to explore the data and three stratified on Gender/sex. Two studies stratified data on each of Education, Socioeconomic, and Social capital factors. No UK studies used Place of residence or Religion/beliefs to examine the data.

Interventions

Type of service / intervention included

UK studies took place in primary care and across nine named secondary care services and a number of unspecified or multiple services (Figure 5). Six studies (26.1%) were based in GP/primary care services, four (17.4%) included multiple services or did not specify which services were involved, three (13.0%) in mental health services, two each (8.7%) in memory clinics, rheumatology services and outpatients, and one each in a number of other services.

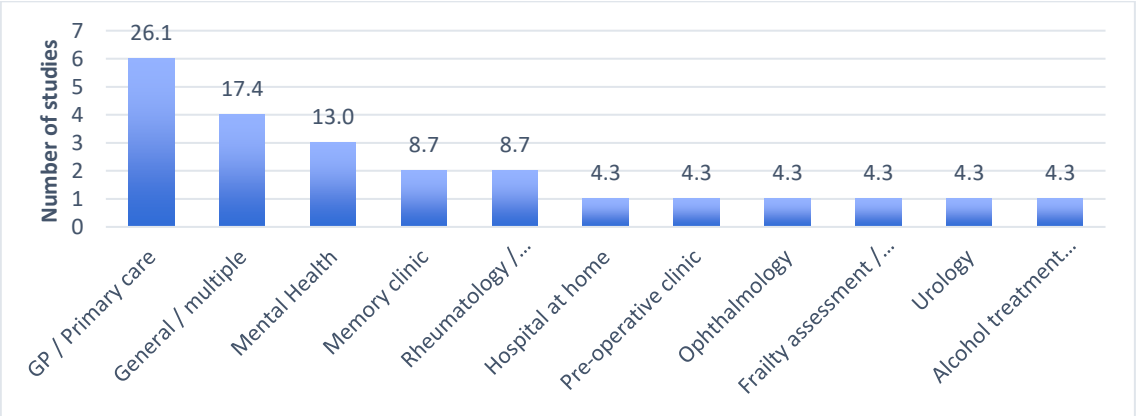


Figure 5: Services included in UK studies

Globally a broader range of services were included, with studies incorporating primary care and 31 named secondary services, including some complex services such as cancer or cardiology. Some services included in the global data may not exist as standalone services in the UK, e.g., hand therapy.

Setting of service delivery/implementation

Figure 6 shows the delivery setting of services, with a spread across primary and secondary care. In the UK services were split between primary care (n=10, 43.5%) and what is traditionally considered secondary care (n=13, 56.5%). Globally 45.4% of services were in primary care (n=67), 54.7% were in secondary (including complex secondary or possibly tertiary services such as cardiology) care (n=81) and five studies included services across primary and secondary care (3.3%).

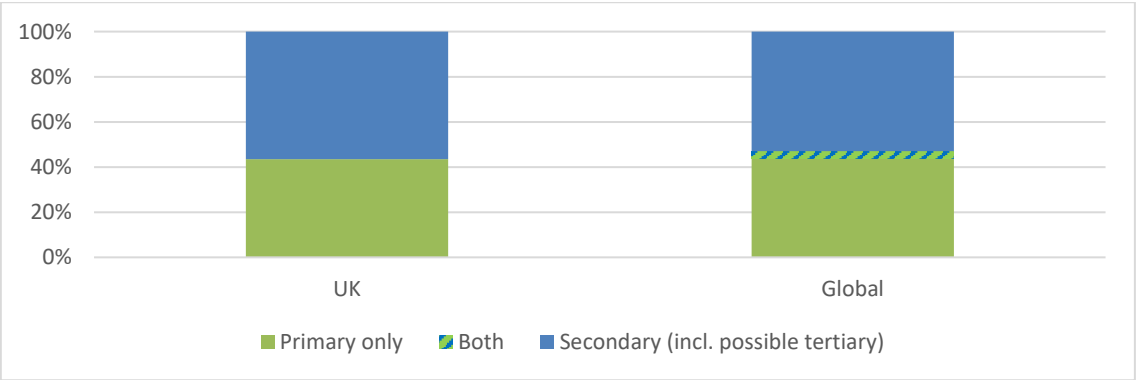


Figure 6: Setting of services / interventions

Figure 7 shows the range of technologies used in the digitalised services included in this review.

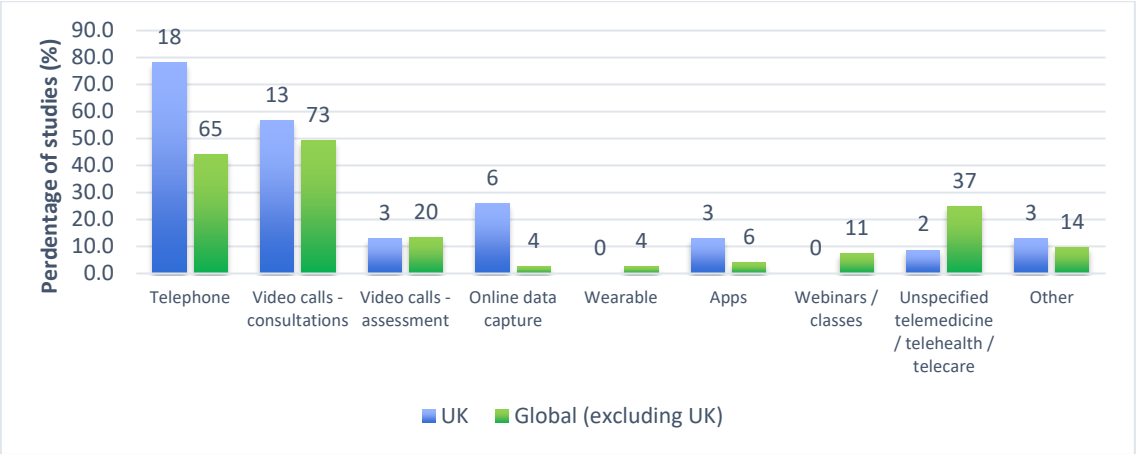


Figure 7: Digitalised services included in studies

Almost half of the digitalised services offered globally were telephone based (n=65, 43.9%), and the comparable figure for UK studies was 78.3% (n=18). Despite this, it was not always clear whether the telephone service required a smart phone or could be accessed using a traditional phone. In the UK 56.5% of studies (n=13) related to the use of video calls for ongoing consultations, and 13.0% (n=4) included videos for initial assessment purposes, e.g., memory tests. This was broadly in line with the global picture. In 8.7% of UK studies (n=2) and 25% of global studies (n=37) the type of digital technology used was generically described as telecare, telehealth or telemedicine. Studies using online data capture made up a larger proportion of UK studies than globally (UK n=6, 26.1% and globally n=4, 2.7%), these included chat applications and completion of online portal documents or e-consultation. Apps were used in 13.0% (n=3) of UK studies and 4.1% (n=6) global studies, these were primarily COVID-19 tracing apps. Globally 7.4% (n=11) of studies included webinars or online classes delivered by healthcare providers, but we found no UK studies which fitted into this category. The category of ‘other’ technologies (UK n=3, 13.0% and globally n=14, 9.5%) included, e.g., online resource centres set up by specialised services.

Study population

Population characteristics of included studies are shown in Table 6, including sample size and type of participant included in the studies.

Table 6: Population characteristics of included studies

Characteristic		Number of UK studies* (%)	Number of studies globally (excluding UK)* (%)
Sample size	1-5	2 (8.7)	1 (0.7)
	6-20	0 (0.0)	14 (9.5)
	21-100	9 (39.1)	33 (22.3)
	101-500	6 (26.1)	34 (23.0)
	501-1000	0 (0.0)	9 (6.1)
	1000+	5 (21.4)	56 (37.8)
	N/A	1 (4.3)	1 (0.7)
Type of participant	Service user	23 (100.0)	135 (91.2)
	Carer	4 (17.4)	10 (6.8)
	Staff	7 (30.4)	23 (15.5)
	Volunteer / third sector	0 (0.0)	1 (0.7)

* Note totals for some measures may be higher than overall total as categories were not mutually exclusive

Sample size

The majority of UK studies included smaller numbers of participants, with the largest group including 21-100 participants (n=9, 39.1%). Large scale studies with >1000 participants comprised 21.4% of UK studies (n=5). In contrast, globally over one third of the studies were large scale with more than 1000 participants (n=56, 37.8%); nearly a quarter (n=33, 22.3%) had between 21-100 participants and another almost quarter included 101-500 participants (n=34, 23.0%).

Population included in study

Most studies focused solely on the users of digital services (n=118, 79.7% globally and n=14, 60.9% of UK studies; see Figure 8). A small number of studies included only staff members (n=12, 8.1%) but none of these took place in the UK. No studies including only unpaid carers of older people utilising digital services were identified. Studies integrating staff and / or carer perspectives alongside evidence from service users were limited: service user / staff inclusion accounted for 4.7% of studies globally (n=7) and 21.7% of UK studies (n=5), service user / unpaid carers inclusion was seen in 4.7% of global studies (n=7) and 8.7% UK studies (n=2), and services users / staff /unpaid carer perspectives were captured in 2.0% global studies (n=3) and 8.7% of UK studies (n=2).

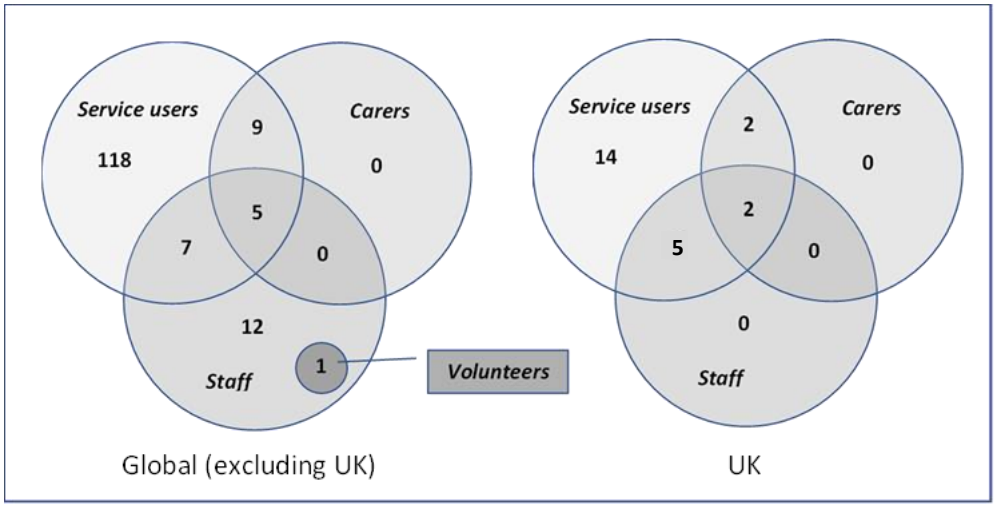


Figure 8: Types of participants included in studies

Outcomes

Table 7 shows the outcomes captured by studies. In the UK over half (n=13, 56.5%) included participants' qualitative experiences or perceptions, nine (39.1%) focused on quantitative experiences/ perceptions, six (26.1%) explored the utilisation of digitalised services e.g., how often services were accessed, who accessed the services, or the method used to access services, and only four (17.4%) included health outcomes such as scores on mental assessments or COVID-19 infection levels. In contrast global studies were much more focused on the utilisation of digitalised services / telehealth (n=74, 50.0%). Qualitative experiences / perceptions were captured in 27 (18.2%), quantitative experiences / perceptions in 45 (30.4%) and health outcomes in 29 (19.6%) studies.

Table 7: Outcomes collected in included studies

Outcomes collected	***Number of UK studies (%)***	***Number of studies globally (excluding UK) (%)***
Utilisation	6 (25.0)	74 (50.0)
Qualitative Experiences / perceptions	13 (54.2)	27 (18.2)
Quantitative Experiences/perceptions	9 (37.5)	45 (30.4)
Health outcomes	4 (16.7)	29 (19.6)

Synthesis of evidence – gap maps

Data from the mapping review were synthesised to produce evidence gap maps using EPPI-Mapper[29].
Figure 9 shows an example of an evidence gap map summarising the UK evidence; columns reflect the types of service included and rows show the technology type. Each cell shows the quantity of evidence available, with the data segmented by study outcomes. The interactive maps can be accessed online, and data sorted using the filters button at the top of the map, e.g., type of data collected, study participants, inclusion of PROGRESS-Plus categories. You can hover over each of the data bubbles for information and click on data to reveal information about individual studies within the cell.

The full maps are available using the links below: (see also Appendix 5 for full URLs)

- Map A. UK Services and technology vs outcomes
- Map B. Global Services and technology vs outcomes

We also develop maps displaying the collection and use of PROGRESS-Plus factors across different services and technologies, these can be accessed through the following links:

- Map C. UK Services and technology vs PROGRESS Plus collected
- Map D. UK Services and technology vs PROGRESS Plus stratification
- Map E. UK Technology and outcomes vs PROGRESS Plus collected
- Map F. UK Technology and outcomes vs PROGRESS Plus stratification

PROGRESS-Plus factors collected in individual studies were predominantly characteristics associated with discrimination including age (6 studies), race/ethnicity/ culture/language (4 studies), gender/sex (3 studies), and socioeconomic (or deprivation) data (3 studies) in studies focusing on telephone consultations. The evidence from many other services did not identify the collection of PROGRESS-Plus data except for the inclusion of age, e.g., physiotherapy or cancer services.

In terms of utilisation of the PROGRESS-Plus, the number of studies using these factors to interpret their data was small. For example, whilst eleven studies collected ‘characteristics associated with discrimination’ in studies capturing qualitative experiences in relation to telephone consultations only 4 of these used this factor as a lens to interpret the findings of the study. One study used socioeconomic factors to stratify data focusing on telephone consultations and one study exploring the use of hospital at home used more than six PROGRESS-Plus factors to segment the data.

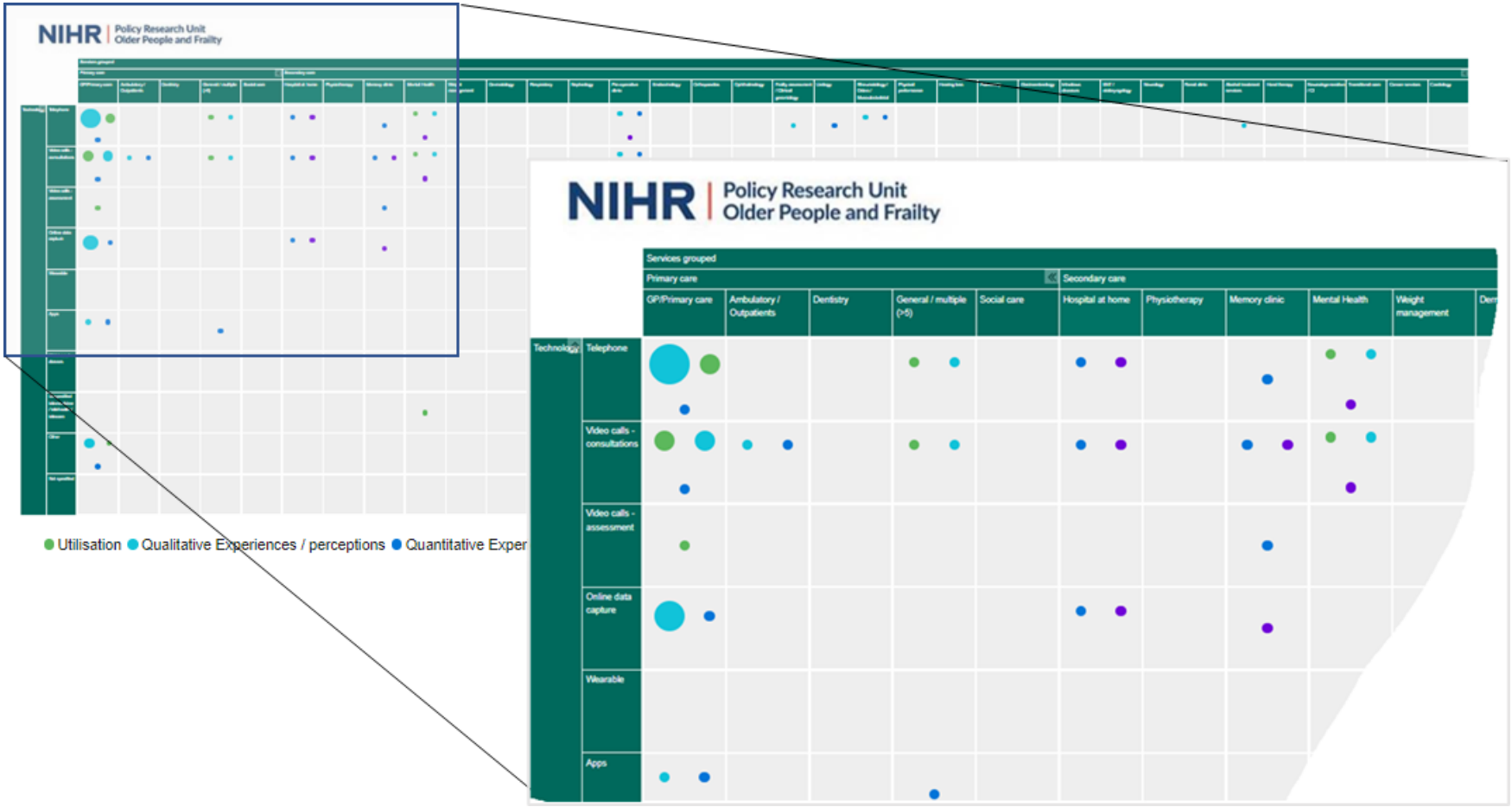


Figure 9: Example of evidence gap map of services, technology, and outcomes in the UK

Discussion

Summary of findings

This mapping review summarised the evidence around the digitalisation of health and care services for older people during the COVID-19 pandemic, both globally and in the UK. In total, we found 172 studies, 24 of which were UK-based. The majority of studies in the UK were small scale, qualitative studies exploring older people's perceptions and experiences of digitalised/remote health and care services. The evidence map allowed us to identify rapidly where evidence is currently lacking and highlighted the limited amount of published evidence in the UK exploring older people's use and experience of interacting with digitalised services during the COVID-19 pandemic.

Key findings

Key findings relating to UK studies were identified in relation to the population, intervention, and outcomes. UK studies were more often smaller scales studies with between 21-100 participants or 101-500 participants, focusing on participants qualitative experiences of using digitalised services during the COVID-19 pandemic. There were fewer large-scale studies providing evidence on the utilisation of services and on outcomes related to the use of digitalised services at a population level. Within both the UK and global evidence, we found few studies including the experiences of unpaid carers of people using digitalised services. As unpaid carers (many older people themselves) can provide vital support to older people using these services it is important to understand their experiences, and the barriers and facilitators they encounter using digitalised services.

Gaps were identified in the data around the health and care services in UK studies. Included services were split between primary care services, in particular GP services, and a limited number of what are traditionally considered secondary services. Globally there was evidence on a wider range of secondary services, including complex services such as cancer and cardiology. More information is needed in a UK context on which specific services have been digitalised and how this has been implemented to understand whether gaps in the evidence are as a result of non-digitalisation of services or of digitalisation which may have taken place in the absence of evaluation.

A further gap was uncovered in the evidence related to the digitalisation of services in the care sector. We found little evidence globally and no UK studies looking at the use, or experiences of using, digitalised services in the care sector. As with other services it is unclear whether the lack of data is due to the non-digitalisation of services or non-evaluation of digitalised services, possibly as a result of rapid introduction and urgency during the COVID-19 pandemic. This is an area where more research is warranted.

The type of technology included in UK studies was seemingly limited with most studies focussed on the use of telephone delivery of services, and a smaller number including video services to facilitate practitioner/patient interactions. There was a lack of clarity around whether the telephone services were specifically digital and required, e.g., a smart phone to upload pictures, or whether they could be delivered using traditional landline phones. This gap needs to be addressed to give a clearer understanding of the technology needed and how this affects participant's experiences of using telephone services. There are also opportunities to focus on a wider range of potential digital health technologies such as remote health

monitoring equipment in order to understand the benefits and barriers of using these to deliver digitalised services to older people.

Very few UK studies utilising a longitudinal design were identified; only one measuring utilisation[138] and a second health outcomes[168]. Further work exploring health outcomes of those who use/used digitalised services would help to shine a spotlight on the impact of digitalisation on utilisation and health outcomes at a population level.

A key gap in the evidence was the lack of equity factors, such as those in the PROGRESS-Plus framework, which were gathered in UK studies. For example, all UK studies included in this mapping review collected information on age, which comes under the Plus aspects of PROGRESS, nevertheless fewer than half stratified their data to explore the effect of this factor. Since digital exclusion due to other equity factors such as disabilities, education (less technological knowledge and competency) and reduced social capital to support achieving proficiency in using digital technology increase with age it is important to consider these aspects when introducing digitalised services. Stratification using age is a first step to identifying where older people, including the oldest old, may be at greater risk of encountering barriers to using digitalised services, however the intersectionality of age and other equity factors is essential to understand and action where the need for support is greatest.

Collecting data on equity factors is essential to facilitate disaggregation of data, build an understanding of which factors, or combination of factors disadvantage older people when services are digitalised, and actively target interventions and support to reduce disparities[205]. Further details of the key UK evidence gaps identified during this mapping review, together with suggested research and policy relevance, are presented in Table 8.

Table 8: Evidence gaps identified in review

Evidence gap	Research relevance	Policy relevance
POPULATION		
Sample size	UK studies tended to be small scale, between 21-100 participants (n=9), 101-500 (n=7). These are mostly studies exploring qualitative or quantitative experiences of participants focusing mainly on telephone services and some on video consultations. There is a need for more larger-scale studies to understand the utilisation and outcomes of service users at a population level. Recommend: • Analysis of larger-scale data sets to understand utilisation and outcomes for people who do or do not use digitalised services • An understanding of whether the introduction of digitalised services during the COVID-19 pandemic has led to behaviour change and more older people using digital services even if face-to-face services have been reinstated.	Larger scale studies will help to identify where the use of digitalised services is greatest, and can aid in targeting groups most in need of support to access digitalised services
The experiences of unpaid carers	There is little UK data on the role of unpaid carers in facilitating older people's use of digitalised services. Recommend more: • Quantitative understanding of carer's utilisation of digitalised services with and on behalf of older people and	Unpaid carers can be key for supporting and facilitating older people's access to digitalised services and enabling them to take more control of their own health. Unpaid carers many of whom are older people themselves also need the skills and expertise to be able to do this.

	• In-depth qualitative evidence on the experiences of UK unpaid carers using digitalised services for/ with the person they care for	
PROGRESS-Plus measures	Equity data are not collected as a matter of course in most studies. Recommend: • Collect this information to enable disaggregation of data and identify which factors have the greatest impact on inequities in access and use of digitalised services for older people • Use these data to understand more about the intersections between age, other PROGRESS-Plus factors and the use of digitalised services. • There is a need for more qualitative and quantitative data in the areas identified below, focusing on health disparities exacerbated by the intersections between age and other inequities	Collecting data on equity measures, e.g., PROGRESS-Plus helps to target resources to those who may be most disadvantaged by digitalisation of services, and potentially mitigate the impact of health inequities. This fosters timely access to care and gives people greater control over their health, well-being and independence.
	Place: Location – urban /rural Three UK studies included information about residence in terms of location, i.e., urban or rural. However, no UK studies used this factor to stratify data and evidence is needed to understand the impact of location on the use of digitalised services by older people. Recommend collection of: • Quantitative data on the location of older patients, e.g., distance from healthcare site, and the impact this has on use/acceptance of digitalised services • Qualitative experiences of using digitalised services in rural / urban areas	

	Race/ethnicity/culture/language: older people accessing the UK health and care system, who do not use English as their first language Eight UK studies recorded Race/ethnicity/culture or language and four of these were qualitative studies. Of these only 3 used the factor to stratify the data. There is a need for more research to understand the lived experience of accessing digital services for older people who do not use English as their first language. This may include use of translators, understanding conversations without visual clues or cultural aspects of consultations.	
	Occupation (including unemployment status): Four studies collected data on this factor and two used it to stratify. Although we may expect this to have less impact on use of digital services, occupation could have an indirect impact through socioeconomic status, social capital and disabilities or health conditions associated with employment.	
	Gender/sex: Although 13 studies collected this information only three used it to explore the data. As gender may impact on the type and frequency of communication between practitioners and patients this is an area that may warrant further consideration.	
	Religion/beliefs: No UK studies segmented using this or collected data on this factor. We do not know if this factor affects use / experience of using digitalised services, but some of the broader cultural aspects may influence this factor.	

	Education: Five studies collected information on this aspect, but only two used it to segment data. This may be important as an indicator of capability and engagement with digitalised services, and more research to understand the experiences of those with different education levels could enable extra support to be implemented if needed.	
	Socioeconomic status: Experiences of older people in more deprived socio-economic groups There is limited evidence on the role socio-economic status (SES) plays in access to, engagement with and experience of digitalised services. Five UK studies included data on SES, but only two used it to explore their findings. Understanding the impact of SES on utilisation and experiences of digitalised services would be beneficial in targeting support to provide hardware and digital access.	
	Social capital (including household composition): There is little evidence exploring the social capital of older people and how this might influence their access to and engagement with digitalised services. Four studies included aspects of social capital, i.e., who people were living with and two utilised this information to stratify their data. However, a clear definition of social capital is needed to frame this work and a better understanding of the support mechanisms and other factors which could help to facilitate or hinder use of digitalised services.	
	PLUS: Older people with disabilities, including sensory impairments, e.g., vision or hearing loss, learning disabilities, e.g. autism, and those with reduced dexterity/mobility.	Importance of transitions and access to care, e.g., after a dementia diagnosis, patients may need greater support to access and use digitalised services

	Recommend: • Qualitative data collection to understand the experiences of older people with disabilities utilising digital services Similarly, more understanding of the experiences of older people living with **cognitive impairment**, and those living with **mental health** conditions would be beneficial in targeting support.	
INTERVENTION		
Services	Within the UK, the focus is mainly on primary and a small number of secondary healthcare providers rather than the more complex services. Globally there is more variation in the services being digitalised and a small number of studies took place in complex secondary/tertiary care services. The feasibility of using digitalisation in more complex care situations and learning from studies in a range of settings in other countries may help to identify new scope for digitalisation in the UK. However more evidence around which services have been digitalised and how this has been implemented is needed. Recommend: • Quantitative data collection to identify which services have been digitalised in the UK (these may or may not have been evaluated) and understand how these services have been implemented. • Qualitative experiences of using different digitalised services and barriers and facilitators for using these	Feed into areas of long term plans, e.g. cancer, and dementia. Allow expansion of digitalisation into new services and promote greater wellbeing and independence.
Utilisation of digital services in the care sector	No UK study explored the use of digitalisation in the care sector. Recommend:	This would give care service users more autonomy over their care and allow them to remain independent.

	• Quantitative data be collected to understand the utilisation of digitalised services in the care sector • Qualitative exploration of the experiences of service users, family and staff	However, issues of access, privacy, control etc. need to be considered
Technology type	Most UK studies focus on telephone delivery of services and a smaller number include video consultations. It is not always clear with telephone interactions whether they are digital or regular phone communication. Recommend: • Quantitative research to clarify technologies utilised in digital services and their prevalence in health and care. • Qualitative exploration of the use of technology other than telephone communications to deliver health and care messaging and services, e.g., the NHS app	Wider variation in evidence on type of technology used will provide more understanding of the potential scope of digitalised services and offer insights into new areas of potential implementation. Better understanding of older people's use of and experiences of other technology, e.g. the NHS app, will allow for further expansion of the 'front door' to digitalised services.
OUTCOMES		
Health impacts of using / not using digitalised services over time	Recommend: Using population health data to identify disparities in outcomes for those using/ not using digital services.	This would help to understand which inequities have the most impact on health disparities and outcomes.

Implications for policy

The digitalisation of health and care services is a key policy focus as part of the digital transformation agenda. Digital First, Empower the Person Roadmap and the June 2022 plan for digital health and care, amongst others, recognise the importance of focusing resources and support towards those who are most in need to ensure greatest uptake and utilisation of services. However, as this review has highlighted, there is a current lack of evidence informing our understanding of the relationship between inequities and the digitalisation of health and care services for older people during the COVID-19 pandemic. Further quantitative and qualitative work is required to develop a more granular understanding of potential inequities among older people arising from pandemic-driven digitalisation of health and care services, and to develop insights to guide future development and implementation of digitalised services.

Strengths and limitations

This evidence gap mapping review has enabled us to explore the landscape of older people's services digitalised during the COVID-19 pandemic, and clearly identify gaps in the evidence base. However, we noted some limitations.

We applied strict inclusion and exclusion criteria developed in consultation with experts in the field, however they do limit the evidence we have been able to show on the maps. Formal interventions and published studies were more like to be included in the review as they often included clearer population demarcation, service provision and outcomes. Some of the grey literature, in particular small scale local studies and proposed studies, may have been excluded as we were not able to establish whether they met the inclusion criteria.

We recognise that there are reports in the grey literature, which explore impacts of digitalised health and care on older adults but were not included in our review. Examples include work by Healthwatch[206] and the Digital playbooks[207] which have been undertaken at a mainly local or service level, and can be built on to provide a more comprehensive picture. These reports were excluded from the present review as they did not clearly focus on implications for people aged 65 and over. Other organisations have recently focused on aspects of digitalised care for older people, such as the British Geriatrics Society's August 2022 position statement on virtual wards, which highlights a forthcoming rapid evidence review (preprint published June 2022, currently awaiting peer review)[208]. The majority of cited evidence in the virtual wards review was published pre-pandemic and this work would not have been included in our review.

A large study published in June 2022 explored the impact of telephone triage on access to primary care for people living with multiple long-term health conditions, before and after the onset of the pandemic[209]. The study stratifies analysis by a range of sociodemographic variables, including age, but not in combination with age. The analysis relating to the pandemic period shows that between April and November 2020, older people were more likely than others to have a problem for which they would need to access primary care. However, people in employment and people who were shielding were more likely than others to try to access a GP, and people living in rural, rather than urban areas, were more likely to be offered a face-to-face appointment than an online or telephone consultation. We mention this work here to illustrate that this is a rapidly moving area of research.

We included only English language evidence in the review, and this may have excluded a number of studies which may have otherwise met our inclusion criteria, and produced a bias toward North American, Australian/New Zealand and UK studies.

Reporting of some aspects of the included studies was not always clear. This made classification of some studies more complex, e.g., the setting of services in regions outside the UK did not always fit with NHS settings and classifications. However, it was important to include these studies as they allowed us to place UK evidence in a global context.

Conclusion

This mapping review has summarised the evidence reporting on the digitalisation of health and care services for older people during the COVID-19 pandemic. We have collated published English language studies globally with the addition of grey literature from the UK, and this has allowed us to place the UK data in the context of global research. The body of work in the UK is currently relatively small (23 studies), with most global research taking place in North America (113 studies). There is a need for a greater focus on the implementation of digitalised services for older people, with a particular focus on understanding how the intersection of equity measures with older age can impact access, utilisation, and experiences of using such services.

References

1. World Health Organization. (2021). *Global strategy on digital health 2020-2025*. Available from: https://www.who.int/docs/default-source/documents/gs4dhdaa2a9f352b0445bafbc79ca799dce4d.pdf.
2. NHS England. (2022). *Digital First Primary Care*. Available from: https://www.england.nhs.uk/gp/digital-first-primary-care/.
3. NHS. (2019). *The NHS Long Term Plan*. Available from: https://www.longtermplan.nhs.uk/wp-content/uploads/2019/08/nhs-long-term-plan-version-1.2.pdf.
4. Department of Health and Social Care and NHS England. (2022). *A plan for digital health and social care*. Available from: https://www.gov.uk/government/publications/a-plan-for-digital-health-and-social-care/a-plan-for-digital-health-and-social-care.
5. NHS Digital. (2022). *What we mean by digital inclusion*. Available from: https://digital.nhs.uk/about-nhs-digital/our-work/digital-inclusion/what-digital-inclusion-is.
6. Cabinet Office. (2021). *COVID-19 Response - Spring 2021 (Summary)*. Available from: https://www.gov.uk/government/publications/covid-19-response-spring-2021/covid-19-response-spring-2021-summary.
7. Gasser, U., Ienca, M., Scheibner, J., Sleigh, J., and Vayena, E. (2020). *Digital tools against COVID-19: taxonomy, ethical challenges, and navigation aid.* The Lancet Digital Health. **2**(8): p. e425-e434.https://doi.org/10.1016/S2589-7500(20)30137-0
8. Centre for Ageing Better. (2021). *COVID-19 and the Digital Divide*. Available from: https://ageing-better.org.uk/sites/default/files/2021-07/COVID-19-and-the-digital-divide.pdf.
9. Manchester Urban Ageing Research Group. (2020). *COVID-19 and Social Exclusion: Experiences of older people living in areas of multiple deprivation*. Available from: https://documents.manchester.ac.uk/display.aspx?DocID=56003.
10. McGarrigle L. and Todd C. (2021). *Falls prevention in a digital age: addressing the digital divide*. On Digital Inequalities. . Available from: https://documents.manchester.ac.uk/display.aspx?DocID=55160.
11. Government Digital Service. (2022). *Health disparities and health inequalities: applying All Our Health*. Available from: https://www.gov.uk/government/publications/health-disparities-and-health-inequalities-applying-all-our-health/health-disparities-and-health-inequalities-applying-all-our-health.
12. Watt, T., Raymond, A., and Rachet-Jacquet, L. (2022). *Quantifying health inequalities in England*. Available from: https://www.health.org.uk/news-and-comment/charts-and-infographics/quantifying-health-inequalities.
13. Kunonga, T.P., Spiers, G.F., Beyer, F.R., Hanratty, B., Boulton, E., Hall, A., Bower, P., Todd, C., and Craig, D. (2021). *Effects of Digital Technologies on Older People's Access to Health and Social Care: Umbrella Review.* Journal of Medical Internet Research. **23**(11): p. e25887.https://doi.org/10.2196/25887
14. NHS. (2019). *Empower the person: roadmap for digital health and care services*. [cited 22.08.2022]; Available from: https://indd.adobe.com/view/119c9ee5-6acb-4f52-80c2-d44fc03fdc91.
15. World Health Organization. (2021). *It's time to build a fairer, healthier world for everyone, everywhere*. Health equity and its determinants. Available from: https://cdn.who.int/media/docs/default-source/world-health-day-2021/health-equity-and-its-determinants.pdf.
16. The Equality and Human Rights Commission. (2022). *Understanding equality*. Available from: https://www.equalityhumanrights.com/en/secondary-education-resources/useful-information/understanding-equality.

17. U.S. Food and Drug Administration. (2020). *What is Digital Health?* [cited 01.09.2022]; Available from: https://www.fda.gov/medical-devices/digital-health-center-excellence/what-digital-health.
18. James, K.L., Randall, N.P., and Haddaway, N.R. (2016). *A methodology for systematic mapping in environmental sciences.* Environmental evidence. **5**(1): p. 1-13.https://doi.org/10.1186/s13750-016-0059-6
19. Booth, A. (2001). *Systematic reviews of health information services and systems.* Health Information and Libraries Journal. **18**: p. 60-3
20. O'Neill, J., Tabish, H., Welch, V., Petticrew, M., Pottie, K., Clarke, M., Evans, T., Pardo, J.P., Waters, E., and White, H. (2014). *Applying an equity lens to interventions: using PROGRESS ensures consideration of socially stratifying factors to illuminate inequities in health.* Journal of clinical epidemiology. **67**(1): p. 56-64
21. Manchester Community Central. (2022). *Greater Manchester Older People's Network*. [cited 22.08.2022]; Available from: https://www.gmopn.org.uk/.
22. McGarrigle, L. and Todd, C. (2020). *Promotion of Physical Activity in Older People Using mHealth and eHealth Technologies: Rapid Review of Reviews.* J Med Internet Res. **22**(12): p. e22201.https://doi.org/10.2196/22201
23. World Health Organization. (2022). *WHO COVID-19 Research Database*. Available from: https://search.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/.
24. Social Care Institute for Excellence. (2006). *Social care online*. Social Care; Available from: https://www.scie-socialcareonline.org.uk/.
25. Charles, A. (2019). *Community health services explained*. [cited 22.08.2022]; Available from: https://www.kingsfund.org.uk/publications/community-health-services-explained.
26. Ouzzani, M., Hammady, H., Fedorowicz, Z., and Elmagarmid, A. (2016). *Rayyan—a web and mobile app for systematic reviews.* Systematic reviews. **5**(1): p. 1-10
27. Thomas, J., Graziosi, S., Brunton, J., Ghouze, Z., O'Driscoll, P., and Bond, M. (2020). *EPPI-Reviewer: advanced software for systematic reviews, maps and evidence synthesis*. EPPI-Centre Software. London: UCL Social Research Institute; Available from: https://eppi.ioe.ac.uk/cms/About/AboutEPPIReviewer/tabid/2967/Default.aspx.
28. Cochrane Methods Equity. (2022). *PROGRESS-Plus*. [cited 22.08.2022]; Available from: https://methods.cochrane.org/equity/projects/evidence-equity/progress-plus.
29. Digital Solution Foundary and EPPI-Centre. (2022). *EPPI-Mapper, Version 2.1.0.*; Available from: http://eppimapper.digitalsolutionfoundry.co.za/#/.
30. Abrashkin Karen, A., Zhang, J., and Poku, A. (2021). *Acute, Post-acute, and Primary Care Utilization in a Home-Based Primary Care Program During COVID-19.* Gerontologist. **61**(1): p. 78-85.https://doi.org/10.1093/geront/gnaa158
31. Ackroyd Sarah, A., Walls Melinique Kim Josephine, S., and Lee Nita, K. (2022). *Lessons Learned: Telemedicine patterns and clinical application in patients with gynecologic cancers during COVID-19.* Gynecologic Oncology Reports: p. 100986-100986.https://doi.org/10.1016%2Fj.gore.2022.100986
32. Adams, L., Lester, S., Hoon, E., van der Haak, H., Proudman, C., Hall, C., Whittle, S., Proudman, S., and Hill Catherine, L. (2021). *Patient satisfaction and acceptability with telehealth at specialist medical outpatient clinics during the COVID-19 pandemic in Australia.* Intern Med J. **51**(7): p. 1028-1037.https://dx.doi.org/10.1111/imj.15205
33. Alharbi, R.A., Altayyari, F.T., Alamri, F.S., and Alharthi, S.A. (2021). *Pandemic-Driven Technology during COVID-19: Experiences of Older Adults.* 24th ACM Conference on Computer-Supported Cooperative Work and Social Computing, CSCW 2021: p. 5-9.https://doi.org/10.1145/3462204.3481769
34. Ali, R. and Samin, P. (2021). *Does Telemedicine Reduce health disparities? Longitudinal Evidence during the COVID-19 Pandemic in the US*: Ali Roghani; University of Utah Samin Panahi; University of Utah.https://doi.org/10.1101/2021.03.01.21252330

35. Aliberti Gianna, M., Bhatia, R., Desrochers Laura, B., Gilliam Elizabeth, A., and Schonberg Mara, A. (2022). *Perspectives of primary care clinicians in Massachusetts on use of telemedicine with adults aged 65 and older during the COVID-19 pandemic.* Prev Med Rep. **26**: p. 101729-101729.https://dx.doi.org/10.1016/j.pmedr.2022.101729
36. Allen Ariel, Z., Zhu, D., Shin, C., Glassman Deborah, T., Abraham, N., and Watts Kara, L. (2021). *Patient Satisfaction with Telephone Versus Video-Televisits: A Cross-Sectional Survey of an Urban, Multiethnic Population.* Urology. **156**: p. 110-116.https://dx.doi.org/10.1016/j.urology.2021.05.096
37. Allen, L., Johnson, T.M., Vaughan, C., and Mirk, A.K. (2021). *Improving geriatric telehealth support for older, rural veterans at risk of diabetic foot complications.* Journal of the American Geriatrics Society. **69**: p. S80-S80.https://doi.org/10.1111/jgs.17115
38. Almandoz Jaime, P., Xie, L., Schellinger Jeffrey, N., Mathew, M.S., Edwards, K., Ofori, A., Kukreja, S., Schneider, B., and Messiah Sarah, E. (2021). *Telehealth utilization among multi-ethnic patients with obesity during the COVID-19 pandemic.* J Telemed Telecare: p. 1357633X21998211-1357633X21998211.https://dx.doi.org/10.1177/1357633X21998211
39. Anderson Timothy, S., O'Donoghue Ashley, L., Dechen, T., Herzig Shoshana, J., and Stevens Jennifer, P. (2021). *Trends in telehealth and in-person transitional care management visits during the COVID-19 pandemic.* J Am Geriatr Soc. **69**(10): p. 2745-2751.https://dx.doi.org/10.1111/jgs.17329
40. Andrade Andre Calabretto Jean-Pierre Pratt Nicole, K.-E. (2021). *Effect of a Digital Precision Public Health Intervention for Care Coordination During Covid-19 Pandemic in Australia: A Real World Study*.https://doi.org/10.21203/rs.3.rs-882615/v1
41. Arighi, A., Fumagalli, G.G., Carandini, T., Pietroboni, A.M., De Riz, M.A., Galimberti, D., and Scarpini, E. (2021). *Facing the digital divide into a dementia clinic during COVID-19 pandemic: caregiver age matters.* Neurol Sci. **42**(4): p. 1247-1251.https://doi.org/10.1007/s10072-020-05009-w
42. Atherton Helen, Bryce Carol, Newbould Jenny, Fleming Joanna, Smith Gillian Grason, and Dale Jeremy. (2020). *The experiences and perceptions of older people, their carers and their general practice teams in using a 'telephone first' approach for access to appointments: a qualitative study.*
43. Aubert Carole, E., Henderson James, B., Kerr Eve, A., Holleman, R., Klamerus Mandi, L., and Hofer Timothy, P. (2022). *Type 2 Diabetes Management, Control and Outcomes During the COVID-19 Pandemic in Older US Veterans: an Observational Study.* J Gen Intern Med. **37**(4): p. 870-877.https://dx.doi.org/10.1007/s11606-021-07301-7
44. Beckman Adam, L., Mechanic Robert, E., Shah Tanya, B., and Figueroa Jose, F. (2021). *Accountable Care Organizations during Covid-19: Routine care for older adults with multiple chronic conditions.* Healthcare. **9**(1): p. 100511-100511.https://dx.doi.org/10.1016/j.hjdsi.2020.100511
45. Bernocchi, P., Bonometti, F., Serlini, M., Assoni, G., Zanardini, M., Pasotti, E., Guerrini, S., and Scalvini, S. (2021). *Telehealth and Telecare: A Real-Life Integrated Experience in the COVID-19 Pandemic.* Telemed. j. e. health.https://dx.doi.org/10.1089/tmj.2021.0181
46. Bhatia, R.S., Chu, C., Pang, A., Tadrous, M., Stamenova, V., and Cram, P. (2021). *Virtual care use before and during the COVID-19 pandemic: a repeated cross-sectional study.* CMAJ Open. **9**(1): p. E107-E114.https://dx.doi.org/10.9778/cmajo.20200311
47. Bigelow Sharon, M., Hart, E., Shaban, T., Rao, P., Khan Ali, A., Baskaron, M., Baker, P., Schwartz Todd, A., and Mayer Deborah, K. (2021). *A new proactive virtual resource center navigation model identifies patient risk factors to reduce barriers to*

cancer care during the COVID-19 pandemic. Support Care Cancer. **29**(10): p. 6069-6077.https://dx.doi.org/10.1007/s00520-021-06147-3
48. Bradwell, H., Baines, R., Edwards Katie, J., Stevens, S., Atkinson, K., Wilkinson, E., Chatterjee, A., and Jones Ray, B. (2022). *Exploring Patient and Staff Experiences With Video Consultations During COVID-19 in an English Outpatient Care Setting: Secondary Data Analysis of Routinely Collected Feedback Data.* JMIR Form Res. **6**(3): p. e30486-e30486.https://dx.doi.org/10.2196/30486
49. Breen, K.E., Tuman, M., Bertelsen, C.E., Sheehan, M., Wylie, D., Fleischut, M.H., Offit, K., Stadler, Z.K., Salo-Mullen, E.E., and Hamilton, J.G. (2022). *Factors Influencing Patient Preferences for Telehealth Cancer Genetic Counseling During the COVID-19 Pandemic.* JCO Oncol Pract. **18**(4): p. e462-e471.https://doi.org/10.1200/op.21.00301
50. Buckinx, F., Aubertin-Leheudre, M., Daoust, R., Hegg, S., Martel, D., Martel-Thibault, M., and Sirois, M.J. (2021). *Feasibility and Acceptability of Remote Physical Exercise Programs to Prevent Mobility Loss in Pre-Disabled Older Adults during Isolation Periods Such as the COVID-19 Pandemic.* J Nutr Health Aging. **25**(9): p. 1106-1111.https://dx.doi.org/10.1007/s12603-021-1688-1
51. Cannon, C. and Mellor, L. (2020). *Experiences of Virtual Appointments during Covid-19*. Available from: internal-pdf://4059283374/Derbyshire_Experiences of virtual appointments.pdf https://www.healthwatch.co.uk/reports-library/experiences-virtual-appointments-during-covid-19.
52. Cao Ying, J., Chen, D., Liu, Y., and Smith, M. (2021). *Disparities in the Use of In-Person and Telehealth Primary Care Among High- and Low-Risk Medicare Beneficiaries During COVID-19.* J Patient Exp. **8**: p. 23743735211065274-23743735211065274.https://dx.doi.org/10.1177/23743735211065274
53. Cao Ying Jessica Chen Dandi Liu Yao Smith, M. (2021). *Disparities in the Use of in-Person and Telehealth Outpatient Visits Among Medicare Beneficiaries in an Accountable Care Organization during COVID-19.* Health Services Research. **56**: p. 5-5.https://doi.org/1111/1475-6773.13717
54. Cavagna, L., Zanframundo, G., Codullo, V., Pisu Maria, G., Caporali, R., and Montecucco, C. (2021). *Telemedicine in rheumatology: a reliable approach beyond the pandemic.* Rheumatology (Oxford). **60**(1): p. 366-370.https://dx.doi.org/10.1093/rheumatology/keaa554
55. Chang, M. and Lipner, S. (2022). *Disparities in Telemedicine Satisfaction Among Older and Non-White Dermatology Patients: A Cross-Sectional Study.* J Drugs Dermatol. **21**(2): p. 210-214.https://dx.doi.org/10.36849/jdd.6410
56. Chang, M.-H., Moonesinghe, R., and Truman Benedict, I. (2022). *Telehealth Availability and Usage Among Medicare Beneficiaries During the COVID-19 Pandemic, October and November 2020.* J Public Health Manag Pract. **28**(1): p. 77-85.https://dx.doi.org/10.1097/PHH.0000000000001448
57. Chen, J., Li Kathleen, Y., Andino, J., Hill Chloe, E., Ng, S., Steppe, E., and Ellimoottil, C. (2021). *Predictors of Audio-Only Versus Video Telehealth Visits During the COVID-19 Pandemic.* J. gen. intern. med.https://dx.doi.org/10.1007/s11606-021-07172-y
58. Chen Matthew Said Noorhanah Mohd Rais Nydia Camelia Mohd Ho, F. (2022). *Remaining agile in the COVID-19 pandemic healthcare landscape – How we adopted a hybrid telemedicine geriatric oncology care model in an academic tertiary cancer center.* Journal of Geriatric Oncology.https://doi.org/10.1016/j.jgo.2022.04.006
59. Choi Namkee, G., DiNitto Diana, M., Marti, C.N., and Choi Bryan, Y. (2021). *Telehealth Use Among Older Adults During COVID-19: Associations With Sociodemographic and Health Characteristics, Technology Device Ownership, and Technology Learning.* J Appl Gerontol: p. 7334648211047347-7334648211047347.https://dx.doi.org/10.1177/07334648211047347
60. Chu, C., Cram, P., Pang, A., Stamenova, V., Tadrous, M., and Bhatia, R.S. (2021). *Rural Telemedicine Use Before and During the COVID-19 Pandemic: Repeated*

Cross-sectional Study. J Med Internet Res. **23**(4): p. e26960-e26960.https://dx.doi.org/10.2196/26960

61. Chu Janet, N., Kaplan, C., Lee Jonathan, S., Livaudais-Toman, J., and Karliner, L. (2022). *Increasing Telehealth Access to Care for Older Adults During the COVID-19 Pandemic at an Academic Medical Center: Video Visits for Elders Project (VVEP).* Jt Comm J Qual Patient Saf. **48**(3): p. 173-179.https://dx.doi.org/10.1016/j.jcjq.2021.11.006
62. Chung Grace, S., Ellimoottil Chad, S., and McCullough Jeffrey, S. (2021). *The Role of Social Support in Telehealth Utilization Among Older Adults in the United States During the COVID-19 Pandemic.* Telemedicine Reports. **2**(1): p. 273-276.https://doi.org/10.1089/TMR.2021.0025
63. Connolly Samantha, L., Stolzmann Kelly, L., Heyworth, L., Sullivan Jennifer, L., Shimada Stephanie, L., Weaver Kendra, R., Lindsay Jan, A., Bauer Mark, S., and Miller Christopher, J. (2022). *Patient and provider predictors of telemental health use prior to and during the COVID-19 pandemic within the Department of Veterans Affairs.* Am Psychol. **77**(2): p. 249-261.https://dx.doi.org/10.1037/amp0000895
64. Cousins, M.M., Van Til, M., Steppe, E., Ng, S., Ellimoottil, C., Sun, Y., and Evans, J.R. (2021). *Age, Race, and Digital Divide Index are Associated With Video Visit Completion for Patients Seen in Radiation Oncology.* International Journal of Radiation Oncology, Biology, Physics. **111**(3): p. e331-e331.https://doi.org/10.1016/j.ijrobp.2021.07.1011
65. Crellin Nadia, E., Herlitz Lauren, S. Sidhu Manbinder, Ellins Jo, Georghiou Theo, Litchfiel Ian, Massou Efthalia, Ng Pei Li, Sherlaw-Johnson Christopher, Tomini Sonila, M., Vindrola-Padros Cecilia, Walton Holly, and Fulop Naomi, J. (2022). *Examining disparities relating to service reach and patient engagement with COVID-19 remote home monitoring services in England: a mixed methods rapid evaluation*: Nadia E Crellin; Nuffield Trust Lauren Herlitz; University College London Manbinder S Sidhu;.https://doi.org/10.1101/2022.02.21.22270793
66. Cui, W. and Finkelstein, J. (2021). *Impact of COVID-19 Pandemic on Use of Telemedicine Services in an Academic Medical Center.* Stud Health Technol Inform. **281**: p. 407-411.https://dx.doi.org/10.3233/SHTI210190
67. Custodero, C., Senesi, B., Pinna, A., Floris, A., Vigo, M., Fama, M., Mastropierro, V., Sabbà, C., Prete, C., and Pilotto, A. (2021). *Validation and implementation of telephone-administered version of the Multidimensional Prognostic Index (TELE-MPI) for remote monitoring of community-dwelling older adults.* Aging clin. exp. res.https://dx.doi.org/10.1007/s40520-021-01871-6
68. Darcourt Jorge, G., Aparicio, K., Dorsey Phillip, M., Ensor Joe, E., Zsigmond Eva, M., Wong Stephen, T., Ezeana Chika, F., Puppala, M., Heyne Kirk, E., Geyer Charles, E., Phillips Robert, A., Schwartz Roberta, L., and Chang Jenny, C. (2021). *Analysis of the Implementation of Telehealth Visits for Care of Patients With Cancer in Houston During the COVID-19 Pandemic.* JCO Oncol Pract. **17**(1): p. e36-e43.https://dx.doi.org/10.1200/OP.20.00572
69. Davis-Ajami, M.L., Lu, Z.K., and Wu, J. (2022). *POSB242 Telemedicine Use During Year 2020 of the COVID-19 Pandemic in Older US Medicare Beneficiaries.* Value in Health. **25**(1): p. S161-S162.https://doi.org/10.1016/j.jval.2021.11.783
70. Davoodi Natalie, M., Chen, K., Zou, M., Li, M., Jiménez, F., Wetle Terrie, F., and Goldberg Elizabeth, M. (2021). *Emergency physician perspectives on using telehealth with older adults during COVID-19: A qualitative study.* J Am Coll Emerg Physicians Open. **2**(5): p. e12577-e12577.https://dx.doi.org/10.1002/emp2.12577
71. Deeb, W., Hess Christopher, W., Gamez, N., Patel, B., Moore, K., and Armstrong Melissa, J. (2021). *Response to Telemedicine Visits From Patients With Parkinsonism During the COVID-19 Pandemic on Postvisit Surveys.* J Patient Exp. **8**: p. 2374373521997224-2374373521997224.https://dx.doi.org/10.1177/2374373521997224

72. Dineva, D., Altun, S., Twaha, T., and Brown, J. (2021). *Service user experience of remote consultations during COVID-19 in an older adult community mental health setting.* BJPsych Open. **7**(S1): p. S20-S20.https://doi.org/10.1192/bjo.2021.109
73. Dowthwaite, L., Fischer, J., Perez, V., Elvira, Portillo, V., Nichele, E., Goulden, M., and McAuley, D. (2021). *Public Adoption of and Trust in the NHS COVID-19 Contact Tracing App in the United Kingdom: Quantitative Online Survey Study.* J Med Internet Res. **23**(9): p. e29085-e29085.https://dx.doi.org/10.2196/29085
74. Dumontier, C., Jaung, T., Bahl, N.E., Magnavita, E.S., Manor, B., Testa, M., Kim, D., Hshieh, T.T., Driver, J., and Abel, G.A. (2021). *Virtual Versus in-Person Frailty Assessments in Older Adults with Hematologic Malignancies.* Blood. **138**: p. 2997-2997.https://doi.org/10.1182/blood-2021-150668
75. Eberly Lauren, A., Kallan Michael, J., Julien Howard, M., Haynes, N., Khatana Sameed Ahmed, M., Nathan Ashwin, S., Snider, C., Chokshi Neel, P., Eneanya Nwamaka, D., Takvorian Samuel, U., Anastos-Wallen, R., Chaiyachati, K., Ambrose, M., O'Quinn, R., Seigerman, M., Goldberg Lee, R., Leri, D., Choi, K., Gitelman, Y., Kolansky Daniel, M., Cappola Thomas, P., Ferrari Victor, A., Hanson, C.W., Deleener Mary, E., and Adusumalli, S. (2020). *Patient Characteristics Associated With Telemedicine Access for Primary and Specialty Ambulatory Care During the COVID-19 Pandemic.* JAMA Netw Open. **3**(12): p. e2031640-e2031640.https://dx.doi.org/10.1001/jamanetworkopen.2020.31640
76. Efthymiadis, A., Hart Edward, J., Guy Alexandra, M., Harry, R., Mahesan, T., Chedid Wissam, A., Uribe-Lewis, S., and Perry Matthew, J. (2021). *Are telephone consultations the future of the NHS? The outcomes and experiences of an NHS urological service in moving to telemedicine.* Future Healthc J. **8**(1): p. e15-e20.https://dx.doi.org/10.7861/fhj.2020-0076
77. Ferguson Jacqueline, M., Jacobs, J., Yefimova, M., Greene, L., Heyworth, L., and Zulman Donna, M. (2021). *Virtual care expansion in the Veterans Health Administration during the COVID-19 pandemic: clinical services and patient characteristics associated with utilization.* J Am Med Inform Assoc. **28**(3): p. 453-462.https://dx.doi.org/10.1093/jamia/ocaa284
78. Friedman Ari, B., Gervasi, S., Song, H., Bond Amelia, M., Chen Angela, T., Bergman, A., David, G., Bailey Julie, M., Brooks, R., and Smith-McLallen, A. (2022). *Telemedicine catches on: changes in the utilization of telemedicine services during the COVID-19 pandemic.* Am J Manag Care. **28**(1): p. e1-e6.https://dx.doi.org/10.37765/ajmc.2022.88771
79. Gagnon, C., Olmand, M., Dupuy Emma, G., Besnier, F., Vincent, T., Grégoire, C.-A., Lévesque, M., Payer, M., Bérubé, B., Breton, J., Lecchino, C., Bouabdallaoui, N., Iglesies-Grau, J., Gayda, M., Vitali, P., Nigam, A., Juneau, M., Hudon, C., and Bherer, L. (2022). *Videoconference version of the Montreal Cognitive Assessment: normative data for Quebec-French people aged 50 years and older.* Aging clin. exp. res.https://dx.doi.org/10.1007/s40520-022-02092-1
80. Gareri, P., Fumagalli, S., Malara, A., Mossello, E., Trevisan, C., Volpato, S., Coin, A., Calsolaro, V., Bellelli, G., Del Signore, S., Zia, G., Ranhoff Anette, H., and Incalzi Raffaele, A. (2021). *Management of Older Outpatients during the COVID-19 Pandemic: The GeroCovid Ambulatory Study.* Gerontology: p. 1-6.https://dx.doi.org/10.1159/000516969
81. Gately, M.E., Tickle-Degnen, L., McLaren, J.E., Ward, N., Ladin, K., and Moo, L.R. (2022). *Factors Influencing Barriers and Facilitators to In-home Video Telehealth for Dementia Management.* Clin Gerontol. **45**(4): p. 1020-1033.https://doi.org/10.1080/07317115.2021.1930316
82. Gell, N., Hoffman, E., and Patel, K. (2021). *Technology Support Challenges and Recommendations for Adapting an Evidence-Based Exercise Program for Remote Delivery to Older Adults: Exploratory Mixed Methods Study.* JMIR Aging. **4**(4): p. e27645-e27645.https://dx.doi.org/10.2196/27645

83. George Michael, D., Danila Maria, I., Watrous, D., Reddy, S., Alper, J., Xie, F., Nowell, W.B., Kallich, J., Clinton, C., Saag Kenneth, G., and Curtis Jeffrey, R. (2021). *Disruptions in Rheumatology Care and the Rise of Telehealth in Response to the COVID-19 Pandemic in a Community Practice-Based Network.* Arthritis Care Res (Hoboken). **73**(8): p. 1153-1161.https://dx.doi.org/10.1002/acr.24626
84. Goenka, A., Ma, D., Teckie, S., Alfano, C., Bloom, B., Hwang, J., and Potters, L. (2021). *Implementation of Telehealth in Radiation Oncology: Rapid Integration During COVID-19 and Its Future Role in Our Practice.* Adv Radiat Oncol. **6**(1): p. 100575-100575.https://dx.doi.org/10.1016/j.adro.2020.09.015
85. Goldberg Elizabeth, M., Jiménez Frances, N., Chen, K., Davoodi Natalie, M., Li, M., Strauss Daniel, H., Zou, M., Guthrie, K., and Merchant Roland, C. (2021). *Telehealth was beneficial during COVID-19 for older Americans: A qualitative study with physicians.* J Am Geriatr Soc. **69**(11): p. 3034-3043.https://dx.doi.org/10.1111/jgs.17370
86. Goldberg Elizabeth, M., Lin Michelle, P., Burke Laura, G., Jiménez Frances, N., Davoodi Natalie, M., and Merchant Roland, C. (2022). *Perspectives on Telehealth for older adults during the COVID-19 pandemic using the quadruple aim: interviews with 48 physicians.* BMC Geriatr. **22**(1): p. 188-188.https://dx.doi.org/10.1186/s12877-022-02860-8
87. Gonzalez Catherine Urizar Claudia Margarita Avila Rosales Elsy, U. (2022). *Is an iPad Enough? Barriers to the Access of Video Telemedicine Services by Outpatient Limited English Proficiency (LEP) Geriatric Psychiatry Latinx Patients During the COVID-19 Pandemic.* The American Journal of Geriatric Psychiatry. **30**(4): p. S48-S48.https://doi.org/10.1016/j.jagp.2022.01.038
88. Goodman-Casanova Jessica, M., Dura-Perez, E., Guzman-Parra, J., Cuesta-Vargas, A., and Mayoral-Cleries, F. (2020). *Telehealth Home Support During COVID-19 Confinement for Community-Dwelling Older Adults With Mild Cognitive Impairment or Mild Dementia: Survey Study.* J Med Internet Res. **22**(5): p. e19434-e19434.https://dx.doi.org/10.2196/19434
89. Griffith, M.F., Donovan, L.M., and Kelley, L.R. (2021). *Video telehealth increased during COVID-19 pandemic among va pulmonary clinics, but barriers remain to reaching similar levels of use as primary care and among high risk groups.* American Journal of Respiratory and Critical Care Medicine. **203**(9).https://doi.org/10.1164/ajrccm-conference.2021.203.1_MeetingAbstracts.A1730
90. Grill, E., Eitze, S., De Bock, F., Dragano, N., Huebl, L., Schmich, P., Wieler Lothar, H., and Betsch, C. (2021). *Sociodemographic characteristics determine download and use of a Corona contact tracing app in Germany-Results of the COSMO surveys.* PLoS One. **16**(9): p. e0256660-e0256660.https://dx.doi.org/10.1371/journal.pone.0256660
91. Haddad, P.A., Hammoud, D., Phelan, M., Wallace-Seamster, R., and Gallagher, K. (2020). *Barriers to Virtual Video Connect (VVC)cancer care among southern rural veterans during theCOVID19 pandemic.* Clinical Cancer Research. **26**(18).https://doi.org/10.1158/1557-3265.COVID-19-PO-006
92. Hajek, A. and König, H.-H. (2022). *Frequency and Correlates of Online Consultations With Doctors or Therapists in Middle-Aged and Older Adults: Nationally Representative Cross-sectional Study.* J Med Internet Res. **24**(4): p. e29781-e29781.https://dx.doi.org/10.2196/29781
93. Hawley Chelsea, E., Genovese, N., Owsiany Montgomery, T., Triantafylidis Laura, K., Moo Lauren, R., Linsky Amy, M., Sullivan Jennifer, L., and Paik Julie, M. (2020). *Rapid Integration of Home Telehealth Visits Amidst COVID-19: What Do Older Adults Need to Succeed?* J Am Geriatr Soc. **68**(11): p. 2431-2439.https://dx.doi.org/10.1111/jgs.16845
94. Healthwatch, D. (2021). *Understanding the impact on Primary Care services and patients in Darlington during the Covid-19 pandemic - Digital Exclusion*. Available

from: ihttps://www.healthwatch.co.uk/reports-library/understanding-impact-primary-care-services-and-patients-darlington-during-covid-19.
95. Healthwatch, S. (2021). *Insight into remote healthcare appointments during the COVID-19 pandemic*. Available from: internal-pdf://2626998812/Salford_Insight into remote healthcare appoint.pdf.
96. Healthwatch, S. (2021). *Digital Health & Care: A report on local experiences in Suffolk and North East Essex*. Available from: internal-pdf://2787498773/Suffolk_Digital-Health-and-Care-Final-Copy.pdf.
97. Hernandez Herb Howard, C., Ong Poh, L., Anthony, P., Ang Siew, L., Salim Nur Bazilah, M., Yew Pey Ying, S., Ali Noorhazlina, B., Lim Jun, P., Lim Wee, S., and Chew, J. (2022). *Cognitive Assessment by Telemedicine: Reliability and Agreement between Face-to-Face and Remote Videoconference-Based Cognitive Tests in Older Adults Attending a Memory Clinic.* Ann Geriatr Med Res. **26**(1): p. 42-48.https://dx.doi.org/10.4235/agmr.22.0005
98. Heyck, L., Seung, Ramondino, S., Gallo, K., and Moist Louise, M. (2022). *A Quantitative and Qualitative Study on Patient and Physician Perceptions of Nephrology Telephone Consultation During COVID-19.* Can J Kidney Health Dis. **9**: p. 20543581211066720-20543581211066720.https://dx.doi.org/10.1177/20543581211066720
99. Hoffman Elise Simon Neta Gell Nancy Patel, K. (2021). *Feasibility and Acceptability of Tele-Enhance Fitness in Older Adults With Knee Osteoarthritis.* Innovation in Aging. **5**: p. 282-282.https://doi.org/10.1093/GERONI/IGAB046.1091
100. Huang, J., Graetz, I., Millman, A., Gopalan, A., Lee, C., Muelly, E., and Reed Mary, E. (2022). *Primary care telemedicine during the COVID-19 pandemic: patient's choice of video versus telephone visit.* JAMIA Open. **5**(1): p. ooac002-ooac002.https://dx.doi.org/10.1093/jamiaopen/ooac002
101. Hudgins, G.A., Roers, L., and Ostertag, S. (2021). *Needs assessment survey for older adult participation in telehealth visits.* Journal of the American Geriatrics Society. **69**: p. S59-S59.https://doi.org/10.1111/jgs.17115
102. Islam, M.S., Das, B.C., Meah, M.M., Paul, S.K., Saha, A.K., Chowdhury, R.U., Ashraf, M., Chowdhury, S.M., Sultana, A., and K, T. (2021). *COMMUNITY ENGAGEMENT in the TELEHEALTH SERVICE for AGED PEOPLE with DIABETES: COVID-19 RESPONSE in BANGLADESH.* Asia Pacific Journal of Health Management. **16**(4).https://doi.org/10.24083/apjhm.v16i4.923
103. Ivy Cynthia, C., Doerrer, S., Naughton, N., and Priganc, V. (2021). *The impact of COVID-19 on hand therapy practice.* J. hand ther.https://dx.doi.org/10.1016/j.jht.2021.01.007
104. Iyer, S., Mehta, P., Weith, J., Hoang-Gia, D., Moore, J., Carlson, C., Choe, P., Sakai, E., and Gould, C. (2021). *Converting a Geriatrics Clinic to Virtual Visits during COVID-19: A Case Study.* J Prim Care Community Health. **12**: p. 21501327211000235-21501327211000235.https://dx.doi.org/10.1177/21501327211000235
105. Jennings Stephen, C., Manning Kenneth, M., Bettger Janet, P., Hall Katherine, M., Pearson, M., Mateas, C., Briggs Brandon, C., Oursler Krisann, K., Blanchard, E., Lee Cathy, C., Castle, S., Valencia Willy, M., Katzel Leslie, I., Giffuni, J., Kopp, T., McDonald, M., Harris, R., Bean Jonathan, F., Althuis, K., Alexander Neil, B., Padala Kalpana, P., Abbate Lauren, M., Wellington, T., Kostra, J., Allsup, K., Forman Daniel, E., Tayade Arti, S., Wesley Alan, D., Holder, A., and Morey Miriam, C. (2020). *Rapid Transition to Telehealth Group Exercise and Functional Assessments in Response to COVID-19.* Gerontol Geriatr Med. **6**: p. 2333721420980313-2333721420980313.https://dx.doi.org/10.1177/2333721420980313
106. Jewett, P., Vogel, R.I., Ghebre, R.G., Rao, A., Hui, J.Y.C., Parsons, H., and Blaes, A.H. (2021). *Telehealth: Reducing or increasing cancer care disparities?* Journal of Clinical Oncology. **39**(15).https://doi.org/10.1200/JCO.2021.39.15_suppl.1582

107. Jewett Patricia, I., Vogel Rachel, I., Ghebre, R., Hui Jane, Y.C., Parsons Helen, M., Rao, A., Sagaram, S., and Blaes Anne, H. (2021). *Telehealth in cancer care during COVID-19: disparities by age, race/ethnicity, and residential status.* Journal of cancer survivorship (Online).https://dx.doi.org/10.1007/s11764-021-01133-4
108. Jiang, X., Yao, J., and You Joyce, H.-S. (2021). *Cost-effectiveness of a Telemonitoring Program for Patients With Heart Failure During the COVID-19 Pandemic in Hong Kong: Model Development and Data Analysis.* J Med Internet Res. **23**(3): p. e26516-e26516.https://dx.doi.org/10.2196/26516
109. Joerg, L., Davoodi, N., and Goldberg, E.M. (2021). *Interviews With Emergency Physicians on Telehealth During COVID-19 and its Role in Caring for Older Americans.* Annals of Emergency Medicine. **78**(2): p. S32-S32.https://doi.org/10.1016/j.annemergmed.2021.07.067
110. Jonker, M., de Bekker-Grob, E., Veldwijk, J., Goossens, L., Bour, S., and Rutten-Van Mölken, M. (2020). *COVID-19 Contact Tracing Apps: Predicted Uptake in the Netherlands Based on a Discrete Choice Experiment.* JMIR Mhealth Uhealth. **8**(10): p. e20741-e20741.https://dx.doi.org/10.2196/20741
111. Johnson, N., Bradley, A., Klawitter, L., Johnson, J., Johnson, L., Tomkinson Grant, R., Hackney Kyle, J., Stastny, S., Ehlers Diane, K., and McGrath, R. (2021). *The Impact of a Telehealth Intervention on Activity Profiles in Older Adults during the COVID-19 Pandemic: A Pilot Study.* Geriatrics. **6**(3).https://dx.doi.org/10.3390/geriatrics6030068
112. Joughin, A., Ibitoye, S., Crees, A., Shipway, D., and Braude, P. (2021). *Developing a virtual geriatric perioperative medicine clinic: a mixed methods healthcare improvement study.* Age Ageing. **50**(4): p. 1391-1396.https://dx.doi.org/10.1093/ageing/afab066
113. Joy, M., McGagh, D., Jones, N., Liyanage, H., Sherlock, J., Parimalanathan, V., Akinyemi, O., van Vlymen, J., Howsam, G., Marshall, M., Hobbs Fd, R., and de Lusignan, S. (2020). *Reorganisation of primary care for older adults during COVID-19: a cross-sectional database study in the UK.* Br J Gen Pract. **70**(697): p. e540-e547.https://dx.doi.org/10.3399/bjgp20X710933

114. Kaihlanen, A.-M., Virtanen, L., Buchert, U., Safarov, N., Valkonen, P., Hietapakka, L., Hörhammer, I., Kujala, S., Kouvonen, A., and Heponiemi, T. (2022). *Towards digital health equity - a qualitative study of the challenges experienced by vulnerable groups in using digital health services in the COVID-19 era.* BMC Health Serv Res. **22**(1): p. 188-188.https://dx.doi.org/10.1186/s12913-022-07584-4
115. Kalicki Alexander, V., Moody Kate, A., Franzosa, E., Gliatto Peter, M., and Ornstein Katherine, A. (2021). *Barriers to telehealth access among homebound older adults.* J Am Geriatr Soc. **69**(9): p. 2404-2411.https://dx.doi.org/10.1111/jgs.17163
116. Kieck, D., Ostir, S., Blair, J., Yenser, E., Chapin, M., Lovett, S., and Pezzino, N. (2021). *Patient perceptions of a student-led remote hypertension education program.* JACCP Journal of the American College of Clinical Pharmacy.https://doi.org/10.1002/jac5.1507
117. Kasle David, A., Torabi Sina, J., Savoca Emily, L., Judson Benjamin, L., and Manes, R.P. (2020). *Outpatient Otolaryngology in the Era of COVID-19: A Data-Driven Analysis of Practice Patterns.* Otolaryngol Head Neck Surg. **163**(1): p. 138-144.https://dx.doi.org/10.1177/0194599820928987
118. Kjerkol, I., Linset, K., and Westeren, K.I. (2021). *Effects of COVID-19 on communication, services, and life situation for older persons receiving municipal health and care services in StjOrdal municipality in Norway.* Human Behavior and Emerging Technologies. **3**(1): p. 204-217.https://doi.org/10.1002/hbe2.244
119. Kreitzberg, D., Dion, E., Humphreys, D., Weiss, D., Cruz, M., and Bauer, T. (2021). *A pilot study of mail-in thyroid test and telemedicine utilization in a consumerinitiated*

testing population. Thyroid. **31**: p. A97-A97.https://doi.org/10.1089/thy.2021.29115.abstracts
120. Lai Frank Ho-yin Yan Elaine Wai-hung Yu Kathy Ka-ying Tsui, W. (2020). *The protective impact of telemedicine on persons with dementia and their caregivers during the COVID-19 pandemic.* The American Journal of Geriatric Psychiatry. **28**(11): p. 1175-1184.http://10.1016/j.jagp.2020.07.019
121. Laurencin, M., Fung, J., Nguyen, A., Galeas, J., and Jih, J. (2021). *Technology-enabled home visits to understand the context of health for older adults with multiple chronic conditions.* Journal of the American Geriatrics Society. **69**: p. S269-S269.https://doi.org/10.1111/jgs.17115
122. Leite Victor, F., Rampim Danielle, B., Jorge Valeria, C., de Lima Maria do Carmo, C., Cezarino Leandro, G., da Rocha Cleber, N., and Esper Rodrigo, B. (2021). *Persistent Symptoms and Disability After COVID-19 Hospitalization: Data From a Comprehensive Telerehabilitation Program.* Arch Phys Med Rehabil. **102**(7): p. 1308-1316.https://dx.doi.org/10.1016/j.apmr.2021.03.001
123. Lee Michelle, S., Guo Lisa, N., Wang, W., and Nambudiri Vinod, E. (2021). *Differences in Utilization of Nonvideo Telemedicine Visits for Dermatologic Concerns in Underserved Populations During the COVID-19 Pandemic.* Telemed J E Health. **27**(8): p. 827-834.https://dx.doi.org/10.1089/tmj.2021.0128
124. Li, W., Shen, S., Yang, J., Guo, J., and Tang, Q. (2022). *Determinants of Satisfaction With Hospital Online Appointment Service Among Older Adults During the COVID-19 Pandemic: A Cross-Sectional Study.* Front Public Health. **10**: p. 853489-853489.https://dx.doi.org/10.3389/fpubh.2022.853489
125. Liang Su-Ying Richardson Michael Chen Tony Colocci Natalia, K. (2021). *Widening cancer care disparities in the adoption of telemedicine during COVID 19: who is left behind?* Gynecologic Oncology. **162**: p. S23-S23.https://doi.org/10.1016/S0090-8258(21)00690-9
126. Liu, J., Ji, B., and Lou, Y. (2021). *Impact of the COVID-19 pandemic on community services for homebound older adults in New York City.* Heal. soc. care community.https://dx.doi.org/10.1111/hsc.13554
127. Liu, L., Goodarzi, Z., Jones, A., Posno, R., Straus Sharon, E., and Watt Jennifer, A. (2021). *Factors associated with virtual care access in older adults: a cross-sectional study.* Age Ageing. **50**(4): p. 1412-1415.https://dx.doi.org/10.1093/ageing/afab021
128. Lott, A., Sacks, H., Hutzler, L., Campbell Kirk, A., and Lajam Claudette, M. (2021). *Telemedicine Utilization by Orthopedic Patients During COVID-19 Pandemic: Demographic and Socioeconomic Analysis.* Telemed J E Health. **27**(10): p. 1117-1122.https://dx.doi.org/10.1089/tmj.2020.0425
129. Lott, A., Campbell Kirk, A., Hutzler, L., and Lajam Claudette, M. (2021). *Telemedicine Utilization at an Academic Medical Center During COVID-19 Pandemic: Are Some Patients Being Left Behind?* Telemed. j. e. health.https://dx.doi.org/10.1089/tmj.2020.0561
130. Mackwood, M.B., Tosteson, T.D., Alford-Teaster, J.A., Curtis, K.M., Lowry, M.L., Snide, J.A., Zhao, W., and Tosteson, A.N.A. (2022). *Factors Influencing Telemedicine Use at a Northern New England Cancer Center During the COVID-19 Pandemic.* JCO Oncol Pract: p. Op2100750-Op2100750.https://doi.org/10.1200/op.21.00750
131. Mao, A., Tam, L., Xu, A., Osborn, K., Sheffrin, M., Gould, C., Schillinger, E., Martin, M., and Mesias, M. (2022). *Barriers to Telemedicine Video Visits for Older Adults in Independent Living Facilities: Mixed Methods Cross-sectional Needs Assessment.* JMIR Aging. **5**(2): p. e34326-e34326.https://doi.org/10.2196/34326
132. Martinez Desirae, J., Hamamsy Karima, C., Hines Susan, E., Daddato Andrea, E., Pearson Scott, M., Lum Hillary, D., Hardland, J., Church Skotti, D., and Tietz Sarah, E. (2021). *Interprofessional student-led outreach to high-risk older adults during the COVID-19 pandemic.* Gerontol Geriatr Educ: p. 1-9.https://dx.doi.org/10.1080/02701960.2021.1958326

133. Mehran Nikki, A., Ferris, C., Yang, M., and Zimmer Rachel, P. (2021). *Calling All House Call Patients: An Intervention for Older Adults During the COVID-19 Pandemic.* J Am Geriatr Soc. **69**(3): p. 600-601.https://dx.doi.org/10.1111/jgs.16998
134. McCarthy, C., Bateman, M.T., Henderson, T., Jean, R., and Evans, R. (2021). *Adoption of telepharmacy within a community health center: A focus on clinical pharmacy services.* JACCP Journal of the American College of Clinical Pharmacy.https://doi.org/10.1002/jac5.1500
135. Miner, S., Masci, L., Chimenti, C., Rin, N., Mann, A., and Noonan, B. (2021). *An Outreach Phone Call Project: Using Home Health to Reach Isolated Community Dwelling Adults During the COVID 19 Lockdown.* J. community health.https://dx.doi.org/10.1007/s10900-021-01044-6
136. Miyawaki, A., Tabuchi, T., Ong Michael, K., and Tsugawa, Y. (2021). *Age and Social Disparities in the Use of Telemedicine During the COVID-19 Pandemic in Japan: Cross-sectional Study.* J Med Internet Res. **23**(7): p. e27982-e27982
137. Munshi Medha Slyne Christine Sifre Kayla Davis Dai'quann, J., Dewar Rachel Sy Sarah, M., Atakov-Castillo Astrid Michals Amy Haque Saira, N., Neuwahl Simon Cummings Stirling Brown Stephen, L., and Weinger Katie Toschi, E. (2021). *Impact of Isolation during the COVID-19 Pandemic on the Care of Older Adults with Type 1 Diabetes: A Qualitative Study.* Diabetes. **70**.https://doi.org/10.2337/db21-572-P
138. Murphy, M., Scott Lauren, J., Salisbury, C., Turner, A., Scott, A., Denholm, R., Lewis, R., Iyer, G., Macleod, J., and Horwood, J. (2021). *Implementation of remote consulting in UK primary care following the COVID-19 pandemic: a mixed-methods longitudinal study.* Br J Gen Pract. **71**(704): p. e166-e177.https://dx.doi.org/10.3399/BJGP.2020.0948
139. Mushtaq, J., Ghulakhszian, A., and Dinah, C. (2021). *Digital profiling and analysis of barriers to teleconsultations among ophthalmic patients in North West London (NWL).* Investigative Ophthalmology and Visual Science. **62**(8)
140. Nearing Kathryn, A., Lum Hillary, D., Dang, S., Powers, B., McLaren, J., Gately, M., Hung, W., and Moo, L. (2020). *National Geriatric Network Rapidly Addresses Trainee Telehealth Needs in Response to COVID-19.* J Am Geriatr Soc. **68**(9): p. 1907-1912.https://dx.doi.org/10.1111/jgs.16704
141. Ng Boon, P. and Park, C. (2021). *Accessibility of Telehealth Services During the COVID-19 Pandemic: A Cross-Sectional Survey of Medicare Beneficiaries.* Prev Chronic Dis. **18**: p. E65-E65.https://dx.doi.org/10.5888/pcd18.210056
142. Ng Boon, P., Park, C., Silverman Ciara, L., Eckhoff Dawn, O., Guest Janeen, C., and Díaz Desiree, A. (2022). *Accessibility and utilisation of telehealth services among older adults during COVID-19 pandemic in the United States.* Heal. soc. care community.https://dx.doi.org/10.1111/hsc.13709
143. Nunnerley Michael Mattek Nora Beattie Zachary Kaye, J. (2021). *Remote Assessment Preferences of NIA Alzheimer's Disease Research Center Participants During COVID-19 Pandemic.* Innovation in aging. **5**: p. 989-989
144. Nuzum Eleanor, Martin Evangelia, Broadbent Matthew, and Stewart Robert (2020). *Mental health service activity during COVID-19 lockdown among individuals with Personality Disorders: South London and Maudsley data on services and mortality from January to May 2020*: Eleanor Nuzum; South London and Maudsley NHS Foundation Trust Evangelia Martin; South London and.https://doi.org/10.1101/2020.09.13.20193730
145. Odukoya, E., Andino, J., Ng, S., Steppe, E., and Ellimoottil, C. (2021). *Predictors of video versus audio-only visits for urologic care during the COVID-19 pandemic.* Journal of Urology. **206**: p. e751-e752.https://doi.org/10.1097/JU.0000000000002060.09
146. Ogawa Elisa Harris Rebekah Dufour Alyssa Morey Miriam Bean, J. (2022). *Reliability of Virtual Physical Performance Assessments in Veterans during the COVID-19 Pandemic.* Archives of Physical Medicine & Rehabilitation. **103**(3): p. e27-e27.https://doi.org/10.1016/j.apmr.2022.01.075

147. Omari Ali, M., Antonacci Christopher, L., Zaifman, J., Johal, A., Conway, J., Mahmood, Y., Klein Gregg, R., Alberta Frank, G., and Koerner John, D. (2021). *Patient Satisfaction with Orthopedic Telemedicine Health Visits During the COVID-19 Pandemic.* Telemed. j. e. health.https://dx.doi.org/10.1089/tmj.2021.0170
148. Orso, F., Herbst, A., Migliorini, M., Ghiara, C., Virciglio, S., Camartini, V., Tognelli, S., Lucarelli, G., Fortini, G., Pratesi, A., Di Bari, M., Marchionni, N., Ungar, A., Fattirolli, F., and Baldasseroni, S. (2022). *Telehealth Management and Risk Stratification of Older Patients With Chronic Heart Failure During COVID-19 Pandemic: Prognostic Evaluation of the TeleHFCovid19-Score.* J Am Med Dir Assoc. **23**(3): p. 421-427.https://dx.doi.org/10.1016/j.jamda.2021.12.024
149. Padala Kalpana, P., Wilson Kerrie, B., Gauss, C.H., Stovall Jessica, D., and Padala Prasad, R. (2020). *VA Video Connect for Clinical Care in Older Adults in a Rural State During the COVID-19 Pandemic: Cross-Sectional Study.* J Med Internet Res. **22**(9): p. e21561-e21561.https://dx.doi.org/10.2196/21561
150. Pagán Veronica, M., McClung Katie, S., and Peden Carol, J. (2021). *An Observational Study of Disparities in Telemedicine Utilization in Primary Care Patients Before and During the COVID-19 Pandemic.* Telemed. j. e. health.https://dx.doi.org/10.1089/tmj.2021.0412
151. Pardolesi, A., Gherzi, L., and Pastorino, U. (2021). *Telemedicine for management of patients with lung cancer during COVID-19 in an Italian cancer institute: SmartDoc Project.* Tumori: p. 3008916211012760-3008916211012760.https://dx.doi.org/10.1177/03008916211012760
152. Paskins, Z., Bullock, L., Manning, F., Bishop, S., Campbell, P., Cottrell, E., Partner, G.P., Jinks, C., Narayanasamy, M., Scott Ian, C., Sahota, O., and Ryan, S. (2022). *Acceptability of, and preferences for, remote consulting during COVID-19 among older patients with two common long-term musculoskeletal conditions: findings from three qualitative studies and recommendations for practice.* BMC Musculoskelet Disord. **23**(1): p. 312-312.https://dx.doi.org/10.1186/s12891-022-05273-1
153. Patel, R., Irving, J., Brinn, A., Broadbent, M., Shetty, H., Pritchard, M., Downs, J., Stewart, R., Harland, R., and McGuire, P. (2021). *Impact of the COVID-19 pandemic on remote mental healthcare and prescribing in psychiatry: an electronic health record study.* BMJ Open. **11**(3): p. e046365-e046365.https://dx.doi.org/10.1136/bmjopen-2020-046365
154. Patel, S., Maye, E., Gannon, A., Cryan, M., Dolan, C., and McCarthy, G. (2021). *Patient and staff satisfaction with remote psychiatry assessments using mobile tablets in long-stay facilities in rural north-west Ireland.* European Psychiatry. **64**: p. S429-S429.https://doi.org/10.1192/j.eurpsy.2021.1145
155. Patskanick Taylor D'Ambrosio, L. (2021). *Experiencing the COVID-19 Pandemic at Age 85 and Over: An MIT AgeLab Study With the 85+ Lifestyle Leaders Panel.* Innovation in Aging. **5**: p. 276-276.https://doi.org/10.1093/GERONI/IGAB046.1068
156. Pelicioni Paulo, H.S., Waters Debra, L., Still, A., and Hale, L. (2022). *A pilot investigation of reliability and validity of balance and gait assessments using telehealth with healthy older adults.* Exp Gerontol. **162**: p. 111747-111747.https://dx.doi.org/10.1016/j.exger.2022.111747
157. Peyrusqué, E., Granet, J., Pageaux, B., Buckinx, F., and Aubertin-Leheudre, M. (2022). *Assessing Physical Performance in Older Adults during Isolation or Lockdown Periods: Web-Based Video Conferencing as a Solution.* J Nutr Health Aging. **26**(1): p. 52-56.https://dx.doi.org/10.1007/s12603-021-1699-y
158. Pham, K., Nieman, C., and Oh, E. (2021). *Feasibility of using a commercially available audiometric mobile application in remote memory care.* Journal of the American Geriatrics Society. **69**: p. S171-S171.https://doi.org/10.1111/jgs.17115
159. Pichan Cayla, M., Anderson Clare, E., Min Lillian, C., and Blazek Mary, C. (2021). *Geriatric Education on Telehealth (GET) Access: A medical student volunteer*

program to increase access to geriatric telehealth services at the onset of COVID-19. J Telemed Telecare: p. 1357633X211023924-1357633X211023924.https://dx.doi.org/10.1177/1357633X211023924
160. Pierce Robert, P. and Stevermer James, J. (2020). *Disparities in use of telehealth at the onset of the COVID-19 public health emergency.* J Telemed Telecare: p. 1357633X20963893-1357633X20963893.https://dx.doi.org/10.1177/1357633X20963893
161. Pitaro Nicholas, L., Barbera Joseph, P., Ranson William, A., Zubizarreta, N., Poeran, J., Chen Darwin, D., Moucha Calin, S., and Hayden Brett, L. (2022). *Evaluating Resource Utilization for In-Person and Virtual Joint Classes in Total Joint Arthroplasty: an Analysis of Attendance Patterns at a large Metropolitan Health System.* J. arthroplasty.https://dx.doi.org/10.1016/j.arth.2022.03.079
162. Porteny, T., Koch-Weser, S., Rifkin, D.E., Isakova, T., Gordon, E.J., Wong, J.B., Rossi, A.P., Weiner, D.E., and Ladin, K. (2021). *Decision-making during uncertain times: A qualitative study of kidney patients, care partners, and nephrologists during the COVID-19 pandemic.* Journal of the American Society of Nephrology. **32**: p. 73-73
163. Priganc, V., Naughton, N., Doerrer, S., and Ivy Cynthia, C. (2021). *A follow up survey on the impact of COVID-19 on hand therapy practice.* J. hand ther.https://dx.doi.org/10.1016/j.jht.2021.07.001
164. Qin, W. (2021). *Adoption of Telehealth Among Older Adults During the COVID-19 Pandemic.* Innovation in Aging. **5**: p. 427-427.https://doi.org/10.1093/GERONI/IGAB046.1649
165. Qin, W. (2022). *Technology Learning and the Adoption of Telehealth Among Community-Dwelling Older Adults During the COVID-19 Outbreak.* J Appl Gerontol: p. 7334648221085473-7334648221085473.https://dx.doi.org/10.1177/07334648221085473
166. Raczek, M., Porter, E., Daley, S., Farina, N., Velayudhan, L., and Abraham, R. (2021). *Patient experience and satisfaction with remote memory assessment: Responding to clinical need in times of COVID-19 restrictions.* Alzheimers Dement. **17**: p. e057818-e057818.https://dx.doi.org/10.1002/alz.057818
167. Raizada Sabrina, R., Cleaton, N., Bateman, J., Mulherin Diarmuid, M., and Barkham, N. (2021). *Are telephone consultations here to stay in rheumatology?* Rheumatol Adv Pract. **5**(1): p. rkaa071-rkaa071.https://dx.doi.org/10.1093/rap/rkaa071
168. Requena-Komuro Mai-Carmen, Jiang Jessica, Dobson Lucianne, Benhamou Elia, Russell Lucy, Bond Rebecca, L., Brotherhood Emilie, V., Greaves Caroline, Barker Suzie, Rohrer Jonathan, D., Crutch Sebastian, J., Warren Jason, D., and Hardy Chris, J.D. (2022). *Neuropsychological assessments for dementia research in the COVID-19 era: comparing remote and face-to-face testing*: Mai-Carmen Requena-Komuro; Dementia Research Centre, Queen Square Institute of Neurology, University.https://doi.org/10.1101/2022.04.28.22274370
169. Ribera Paula Soriano Sandra Climent Carla Vilà Laia Macias, I. (2022). *Patient's preferences on the use of Telemedicine during the Coronavirus disease 2019 (COVID-19) Pandemic. ONCOTELEMED study (preprint)*.https://doi.org/10.21203/rs.3.rs-1533288/v1
170. Roach, P. and et al. (2021). *Understanding the impact of the COVID-19 pandemic on well-being and virtual care for people living with dementia and care partners living in the community.* Dementia: the International Journal of Social Research and Practice. **20**(6): p. 2007-2023.https://doi.org/10.1177/1471301220977639
171. Rodriguez Jorge, A., Betancourt Joseph, R., Sequist Thomas, D., and Ganguli, I. (2021). *Differences in the use of telephone and video telemedicine visits during the COVID-19 pandemic.* Am J Manag Care. **27**(1): p. 21-26.https://dx.doi.org/10.37765/ajmc.2021.88573
172. Sachs Jonathan, W., Graven, P., Gold Jeffrey, A., and Kassakian Steven, Z. (2021). *Disparities in telephone and video telehealth engagement during the COVID-19*

pandemic. JAMIA Open. **4**(3): p. ooab056-ooab056.https://dx.doi.org/10.1093/jamiaopen/ooab056
173. Sano Ellen Benton Emily Kenny James Olsen Erica Heravian, A. (2022). *Telemedicine Use by Older Adults in a COVID-19 Epicenter.* The Journal of Emergency Medicine.https://doi.org/10.1016/j.jemermed.2022.01.024
174. Satin Alexander, M., Shenoy, K., Sheha Evan, D., Basques, B., Schroeder Gregory, D., Vaccaro Alexander, R., Lieberman Isador, H., Guyer Richard, D., and Derman Peter, B. (2020). *Spine Patient Satisfaction With Telemedicine During the COVID-19 Pandemic: A Cross-Sectional Study.* Global Spine J: p. 2192568220965521-2192568220965521.https://dx.doi.org/10.1177/2192568220965521
175. Schifeling Christopher, H., Shanbhag, P., Johnson, A., Atwater Riannon, C., Koljack, C., Parnes Bennett, L., Vejar Maria, M., Farro Samantha, A., Phimphasone-Brady, P., and Lum Hillary, D. (2020). *Disparities in Video and Telephone Visits Among Older Adults During the COVID-19 Pandemic: Cross-Sectional Analysis.* JMIR Aging. **3**(2): p. e23176-e23176.https://dx.doi.org/10.2196/23176
176. Seddon, J., Trevena, P., Wadd, S., Elliott, L., Dutton, M., McCann, M., and Willmott, S. (2022). *Addressing the needs of older adults receiving alcohol treatment during the COVID-19 pandemic: a qualitative study.* Aging & Mental Health. **26**(5): p. 919-924.https://doi.org/10.1080/13607863.2021.1910794
177. Shao Connie, C., McLeod, M.C., Gleason Lauren, T., Dos Santos Marques, I.C., Chu Daniel, I., Wallace Eric, L., Fouad Mona, N., and Reddy, S. (2022). *Inequity in Telemedicine Use Among Patients with Cancer in the Deep South During the COVID-19 Pandemic.* Oncologist.https://dx.doi.org/10.1093/oncolo/oyac046
178. Siette, J., Seaman, K., Dodds, L., Ludlow, K., Johnco, C., Wuthrich, V., Earl, J.K., Dawes, P., Strutt, P., and Westbrook, J.I. (2021). *A national survey on COVID-19 second-wave lockdowns on older adults' mental wellbeing, health-seeking behaviours and social outcomes across Australia.* BMC Geriatr. **21**(1): p. 400.https://doi.org/10.1186/s12877-021-02352-1
179. Skipper, V., Pitsch, D., Vivero, L., Carlson, C., Gould, C.E., Hoang-Gia, D., Weith, J., Walsh, R., and Choe, P. (2021). *Title: Evaluating the effectiveness of a telehealth delivered group exercise program for older adults developed by an interdisciplinary geriatric team.* Journal of the American Geriatrics Society. **69**: p. S255-S256.https://doi.org/10.1111/jgs.17115
180. Soydan, E., Kayikçioğlu, M., and Zoghi, M. (2021). *Telemedicine in cardiology outpatient clinic: First experience from a tertiary medical center during the COVID-19 pandemic.* E Journal of Cardiovascular Medicine. **9**(2): p. 83-93.https://doi.org/10.32596/EJCM.GALENOS.2021-01-08
181. Street Richard, L., Treiman, K., Kranzler Elissa, C., Moultrie, R., Arena, L., Mack, N., and Garcia, R. (2022). *Oncology patients' communication experiences during COVID-19: comparing telehealth consultations to in-person visits.* Support. care cancer.https://dx.doi.org/10.1007/s00520-022-06897-8
182. Szerszen Anita Kogan Yulia Burns, E. (2021). *Telemedicine Use Among Older Adults During the COVID-19 Pandemic.* Innovation in Aging. **5**: p. 469-469.https://doi.org/10.1093/GERONI/IGAB046.1805
183. Tan Yi, R., Tan Maw, P., Khor Mei, M., Hoh Hon, B., Saedon, N.I., Hasmukharay, K., Tan Kit, M., Chin Ai, V., Kamaruzzaman Shahrul, B., Ong, T., Davey, G., and Khor Hui, M. (2021). *Acceptance of virtual consultations among older adults and caregivers in Malaysia: a pilot project during the COVID-19 pandemic.* Postgrad. med.https://dx.doi.org/10.1080/00325481.2021.2004792
184. Tefera Gashaye, M. and Robinson Erin Park, G. (2021). *Technology Use Among Older Adults to Manage their Health During a Global Pandemic.* Innovation in Aging. **5**: p. 742-742.https://doi.org/10.1093/GERONI/IGAB046.2736
185. Thomas, J.T., Huth, H.B., and Yang, M. (2021). *Telehealth Survey for Older Adults and Geriatricians During the COVID-19 Pandemic.* Journal of the American Geriatrics Society. **69**: p. S80-S80

186. Truong, J., Heravian, A., Olsen, E., Kenny, J., Benton, E., and Sano, E.D. (2020). *54 From the COVID-19 Epicenter: Using Telemedicine to Serve the Needs of the Geriatric Population.* Annals of Emergency Medicine. **76**(4): p. S22-S22.https://doi.org/10.1016/j.annemergmed.2020.09.064
187. Tsuang Debby DeGraff Ciara Payne Sarah Jankowski Adrienne, B. (2022). *Remote assessment of cognitive aging and mental health in older Black Americans.* The American Journal of Geriatric Psychiatry. **30**(4): p. S63-S64.https://doi.org/10.1016/j.jagp.2022.01.056
188. van Dijk Silvia Dian, M., Bouman, R., Folmer Ewa, H., den Held Roos, C., Warringa Janet, E., Marijnissen Radboud, M., and Voshaar Richard, C.O. (2020). *(Vi)-rushed Into Online Group Schema Therapy Based Day-Treatment for Older Adults by the COVID-19 Outbreak in the Netherlands.* Am J Geriatr Psychiatry. **28**(9): p. 983-988.https://dx.doi.org/10.1016/j.jagp.2020.05.028
189. Wagner, P., Winkler, A., Paraschivoiu, I., Meschtscherjakov, A., Gärtner, M., and Tscheligi, M. (2021). *Tracing COVID-19 - Older Adults' Attitudes Toward Digital Contact Tracing and How to Increase Their Participation.* Proceedings of Mensch und Computer 2021: p. 349-353.https://doi.org/10.1145/3473856.3474026
190. Wang, J., Spencer, A., Hulme, C., Corbett, A., Khan, Z., Vasconcelos Da Silva, M., O'Dwyer, S., Wright, N., Testad, I., Ballard, C., Creese, B., and Smith, R. (2021). *Healthcare utilisation and physical activities for older adults with comorbidities in the UK during COVID-19.* Heal. soc. care community.https://dx.doi.org/10.1111/hsc.13675
191. Watfa Manal Obeid Bernfeld Nicole, M., Oren Daniel Shani Tali Zigron Asaf Sela Eyal Granot Yigal, D., and Srouji, S. (2021). *Rapid implementation of teledentistry during the Covid-19 lockdown.* Advances in Oral and Maxillofacial Surgery: p. 100031-100031.https://doi.org/10.1016/j.adoms.2021.100031
192. Watt Jennifer, A., Fahim, C., Straus Sharon, E., and Goodarzi, Z. (2021). *Barriers and facilitators to virtual care in a geriatric medicine clinic: a semi-structured interview study of patient, caregiver and healthcare provider perspectives.* Age ageing.https://dx.doi.org/10.1093/ageing/afab218
193. Weber, E., Miller Sarah, J., Astha, V., Janevic, T., and Benn, E. (2020). *Characteristics of telehealth users in NYC for COVID-related care during the coronavirus pandemic.* J Am Med Inform Assoc. **27**(12): p. 1949-1954.https://dx.doi.org/10.1093/jamia/ocaa216
194. Weiss Erica, F., Malik, R., Santos, T., Ceide, M., Cohen, J., Verghese, J., and Zwerling Jessica, L. (2021). *Telehealth for the cognitively impaired older adult and their caregivers: lessons from a coordinated approach.* Neurodegenerative disease management. **11**(1): p. 83-89.https://doi.org/10.2217/nmt-2020-0041
195. Whitney, J. and Goodwin, V. (2022). *Digital and Remote Enhancements for the Assessment and Management of older people living with frailty (DREAM)*,
196. Wong Arkers Kwan, C., Wong Frances Kam, Y., Chow Karen Kit, S., Wong Siu, M., and Lee Paul, H. (2021). *Effect of a Telecare Case Management Program for Older Adults Who Are Homebound During the COVID-19 Pandemic: A Pilot Randomized Clinical Trial.* JAMA Netw Open. **4**(9): p. e2123453-e2123453.https://dx.doi.org/10.1001/jamanetworkopen.2021.23453
197. Yu Nick, C., Zhu Denzel Watts Kara, L., and Abraham Nitya Choice, C. (2021). *Implementation of the Telephone Montreal Cognitive Assessment in a Telemedicine Based Pre-admission Testing Clinic During COVID-19.* Perioperative Care and Operating Room Management: p. 100191-100191.https://doi.org/10.1016/j.pcorm.2021.100191
198. Zachrison Kori, S., Yan, Z., Sequist, T., Licurse, A., Tan-McGrory, A., Erskine, A., and Schwamm Lee, H. (2021). *Patient characteristics associated with the successful transition to virtual care: Lessons learned from the first million patients.* J Telemed Telecare: p. 1357633X211015547-1357633X211015547.https://dx.doi.org/10.1177/1357633X211015547

199. Zeghari, R., Guerchouche, R., Tran, D., Minh, Bremond, F., Lemoine Maria, P., Bultingaire, V., Langel, K., De Groote, Z., Kuhn, F., Martin, E., Robert, P., and König, A. (2021). *Pilot Study to Assess the Feasibility of a Mobile Unit for Remote Cognitive Screening of Isolated Elderly in Rural Areas.* Int. j. environ. res. public health (Online). **18**(11).https://dx.doi.org/10.3390/ijerph18116108
200. Zhou, Y., Schultz, K., Ryskina, K., and Brown, R. (2021). *Older Adults' Access to Primary Care During the 1st Wave of the COVID-19 Pandemic: Gender and Ethnic Disparities in Telemedicine.* Journal of the American Geriatrics Society. **69**: p. S8-S9
201. World Health Organization. (2022). *Countries*. [cited 04.09.2022]; Available from: https://www.who.int/countries.
202. Caballo, B., Dey, S., Prabhu, P., Seal, B., and Chu, P. (2021). *The effects of socioeconomic status on the quality and accessibility of healthcare services*, in *Across The Spectrum of Socioeconomics: Issue IV*. p. 236.
203. Ehsan, A., Klaas, H.S., Bastianen, A., and Spini, D. (2019). *Social capital and health: A systematic review of systematic reviews.* SSM-population health. **8**: p. 100425.https://doi.org/10.1016/j.ssmph.2019.100425
204. Oliver, S., Kavanagh, J., Caird, J., Lorenc, T., Oliver, K., Harden, A., Thomas, J., Greaves, A., and Oakley, A. (2008). *Health promotion, inequalities and young people's health: a systematic review of research.*
205. Lyles, C.R., Sharma, A.E., Fields, J.D., Getachew, Y., Sarkar, U., and Zephyrin, L. (2022). *Centering Health Equity in Telemedicine.* The Annals of Family Medicine. **20**(4): p. 362.https://doi.org/10.1370/afm.282310.1370/afm.2823
206. Healthwatch. (2021). *Locked out: Digitally excluded people's experiences of remote GP appointments*. Available from: https://www.healthwatch.co.uk/sites/healthwatch.co.uk/files/Digital%20Exclusion%20v4.pdf.
207. NHS England. (2022). *Digital Playbooks*. Available from: https://transform.england.nhs.uk/key-tools-and-info/digital-playbooks/.
208. Norman, G., Bennett, P., and Vardy, E.R.L.C. (2022). *Virtual wards: A rapid evidence synthesis and implications for the care of older people.* medRxiv: p. 2022.06.24.22276864.https://doi.org/10.1101/2022.06.24.22276864
209. Saunders CL. and E., G. (2022). *Impact of telephone triage on access to primary care for people living with multiple long-term health conditions: rapid evaluation*. Health and Social Care Delivery Research,. Vol. 10, Southampton, UK.

Appendix 1: Initial scoping of services search strategy for Scopus

Initial search on Scopus, restricted to UK, or unspecified location, studies.

Service	Search terms
GP	(TITLE-ABS-KEY ((digitalisation OR digitalization OR "digital health" OR "digital service" OR virtual OR remote OR "remote consultation" OR "*phone consultation" OR "*phone appointment")) AND TITLE-ABS-KEY ((gp OR "General practitioner" OR doctor OR "primary care*")) AND ALL ((COVID OR pandemic OR COVID*19))) AND PUBYEAR > 2019 AND (LIMIT-TO (AFFILCOUNTRY , "United Kingdom"))
PHYSIO	(TITLE-ABS-KEY ((digitalisation OR digitalization OR "digital health" OR "digital service" OR virtual OR remote OR "remote consultation" OR "*phone consultation" OR "*phone appointment")) AND TITLE-ABS-KEY ((physiotherapy OR "physical therapy" OR rehabilitation OR "occupational therapy")) AND ALL ((COVID OR pandemic OR COVID*19))) AND PUBYEAR > 2019 AND (LIMIT-TO (AFFILCOUNTRY , "United Kingdom"))
MEMORY CLINICS	(TITLE-ABS-KEY ((digitalisation OR digitalization OR "digital health" OR "digital service" OR virtual OR remote OR "remote consultation" OR "*phone consultation" OR "*phone appointment")) AND TITLE-ABS-KEY ((dementia OR alzheimer*)) AND TITLE-ABS-KEY (("memory clinic" OR "cognitive")) AND ALL ((COVID OR pandemic OR COVID*19))) AND PUBYEAR > 2019 AND (LIMIT-TO (AFFILCOUNTRY , "United Kingdom"))
TYPE 2 DIABETES	(TITLE-ABS-KEY ((digitalisation OR digitalization OR "digital health" OR "digital service" OR virtual OR remote OR "remote consultation" OR "*phone consultation" OR "*phone appointment")) AND TITLE-ABS-KEY ((diabetes OR "type 2" OR "type II" OR diabet*)) AND ALL ((COVID OR pandemic OR COVID*19))) AND PUBYEAR > 2019 AND (LIMIT-TO (AFFILCOUNTRY , "United Kingdom"))
‘MEALS-ON-WHEELS” HOME MEALS	(TITLE-ABS-KEY ((digitalisation OR digitalization OR "digital health" OR "digital service" OR virtual OR remote OR "remote consultation" OR "*phone consultation" OR "*phone appointment")) AND TITLE-ABS-KEY (("meals on wheels" OR "meals at home" OR meals)) AND ALL ((COVID OR pandemic OR COVID*19))) AND PUBYEAR > 2019 AND (LIMIT-TO (AFFILCOUNTRY , "United Kingdom"))

Appendix 2: Search strategies for database searches

WHO COVID Database Full Search Strategy

1.	(digital* OR virtual* OR “computer assist” OR “computer assisted” OR “computer assistance” OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR “tele-health” OR telemedicine OR “tele-medicine”) AND
2.	(“older people” OR “older adult” OR “older adults” OR “older woman” OR “older women” OR “older man” OR “older men” OR ageing OR aging OR elderly OR seniors OR geriatric* OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*) AND
3.	year_cluster:("2021" OR "2020" OR "2022")

ASSIA (PROQUEST) Literature Search Strategy

1.	(MAINSUBJECT.EXACT("Technology") OR MAINSUBJECT.EXACT("Telemedicine")) OR
2.	TI(digital* OR virtual* OR "computer assist" OR "computer assisted" OR "computer assistance" OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR "tele-health" OR telemedicine OR "tele-medicine") OR AB(digital* OR virtual* OR "computer assist" OR "computer assisted" OR "computer assistance" OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR "tele-health" OR telemedicine OR "tele-medicine")
3.	(MAINSUBJECT.EXACT("Elderly people") OR MAINSUBJECT.EXACT("Older women") OR MAINSUBJECT.EXACT("Older people") OR MAINSUBJECT.EXACT("Older men")) OR
4.	TI("older people" OR "older adult" OR "older adults" OR "older woman" OR "older women" OR "older man" OR "older men" OR ageing OR aging OR elderly OR seniors OR geriatric* OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*) OR AB("older people" OR "older adult" OR "older adults" OR "older woman" OR "older women" OR "older man" OR "older men" OR ageing OR aging OR elderly OR seniors OR geriatric* OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*)
5.	MAINSUBJECT.EXACT("Pandemics") OR MAINSUBJECT.EXACT("COVID-19") OR
6.	TI(nCoV* OR 2019nCoV OR 19nCoV OR COVID19* OR COVID OR "SARS-COV-2" OR "SARSCOV-2" OR "SARS-COV2" OR SARSCOV2 OR "SARS coronavirus 2" OR "Severe Acute Respiratory Syndrome Coronavirus 2" OR "Severe Acute Respiratory Syndrome Corona Virus 2") OR AB(nCoV* OR 2019nCoV OR 19nCoV OR COVID19* OR COVID OR "SARS-COV-2" OR "SARSCOV-2" OR "SARS-COV2" OR SARSCOV2 OR "SARS coronavirus 2" OR "Severe Acute Respiratory Syndrome Coronavirus 2" OR "Severe Acute Respiratory Syndrome Corona Virus 2")
7.	TI((coronavirus* OR "corona virus*" OR betacoronavirus* OR CoV OR HCoV OR longCOVID* OR "long COVID*" OR postCOVID* OR "post COVID*" OR postcoronavirus* OR "post coronavirus" OR postSARS* OR "post SARS*")) OR AB((coronavirus* OR "corona virus*" OR betacoronavirus* OR CoV OR HCoV OR

	longCOVID* OR "long COVID*" OR postCOVID* OR "post COVID*" OR postcoronavirus* OR "post coronavirus" OR postSARS* OR "post SARS*"))
8.	#5 #3 OR #4
9.	#6 #1 AND #2 AND #5 (restricted to 2020-2022)

Social Care Online Full Search Strategy

1.	PublicationTitle:'digital* OR virtual* OR computer assist OR computer assisted OR computer assistance OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR tele-health OR telemedicine OR tele-medicine'
2.	AND AbstractOmitNorms:'digital* OR virtual* OR computer assist OR computer assisted OR computer assistance OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR tele-health OR telemedicine OR tele-medicine'
3.	AND PublicationTitle:'older OR older people OR older adult OR older adults OR older woman OR older women OR older man OR older men OR aged OR ageing OR aging OR elderly OR senior* OR geriatric* OR middle age OR middle aged OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*'
4.	AND AbstractOmitNorms:'older OR older people OR older adult OR older adults OR older woman OR older women OR older man OR older men OR aged OR ageing OR aging OR elderly OR senior* OR geriatric* OR middle age OR middle aged OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*'
5.	AND PublicationYear:'2020 2022'

Appendix 3 : Grey literature search strategy

Website	Website URL(s)	Search String (s)	Year Filters Applied	Search Fields or Filters Applied	Results Retrieved
UKRI - Database (Downloadable Files)	GtR (ukri.org)	(digital* OR virtual* OR “computer assist” OR “computer assisted” OR “computer assistance” OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR “tele-health” OR telemedicine OR “tele-medicine”) AND (“older people” OR “older adult” OR “older adults” OR “older woman” OR “older women” OR “older man” OR “older men” OR ageing OR aging OR elderly OR seniors OR geriatric* OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*)	2020, 2021, 2022	ORCID/iD, Project/Abstract, Project/Reference, Project/Title	173
Dunhill Medical	https://dunhillmedical.org.uk/?s=digital	Digital	N/A	N/A	8
	You searched for virtual - The Dunhill Medical Trust	Virtual	N/A	N/A	4
	You searched for technology - The Dunhill Medical Trust	Technology	N/A	N/A	26
NIHR (Funding Awards)	https://fundingawards.nihr.ac.uk/	(digital* OR virtual* OR “computer assist” OR “computer assisted” OR “computer assistance” OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR “tele-health” OR telemedicine OR “tele-medicine”)AND(“older people” OR “older adult” OR “older adults” OR “older woman” OR “older women” OR “older man” OR “older men” OR ageing OR aging OR elderly OR seniors OR geriatric* OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*)	2020, 2021, 2022	N/A	697

NIHR(Journals Library)	https://www.journalslibrary.nihr.ac.uk/#/	(digital* OR virtual* OR “computer assist” OR “computer assisted” OR “computer assistance” OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR “tele-health” OR telemedicine OR “tele-medicine”)AND(“older people” OR “older adult” OR “older adults” OR “older woman” OR “older women” OR “older man” OR “older men” OR ageing OR aging OR elderly OR seniors OR geriatric* OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*)	2020	N/A	296
		(digital* OR virtual* OR “computer assist” OR “computer assisted” OR “computer assistance” OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR “tele-health” OR telemedicine OR “tele-medicine”)AND(“older people” OR “older adult” OR “older adults” OR “older woman” OR “older women” OR “older man” OR “older men” OR ageing OR aging OR elderly OR seniors OR geriatric* OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*)	2021	N/A	314
		(digital* OR virtual* OR “computer assist” OR “computer assisted” OR “computer assistance” OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR “tele-health” OR telemedicine OR “tele-medicine”)AND(“older people” OR “older adult” OR “older adults” OR “older woman” OR “older women” OR “older man” OR “older men” OR ageing OR aging OR elderly OR seniors OR geriatric* OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*)	2022	N/A	156
NIHR(Scan Medicine)	https://scanmedicine.com/devices	(digital* OR virtual* OR “computer assist” OR “computer assisted” OR “computer assistance” OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR “tele-health” OR telemedicine OR “tele-medicine”)AND(“older people” OR “older adult” OR “older adults” OR “older woman” OR “older women” OR “older man” OR “older men” OR ageing OR aging OR elderly OR seniors OR geriatric* OR sexagenarian* OR septuagenarian* OR octogenarian* OR nonagenarian* OR centenarian* OR supercentenarian*)	2020	N/A	1173
NIHR(Evidence)		Digital AND Older	N/A	Non-Selected	43

		Virtual AND Older	N/A	Non-Selected	12
		Computer AND Older	N/A	Non-Selected	16
		(\"Virtual\" OR \"Digital\") AND (\"Older\" OR \"Elder\")	N/A	Non-Selected	3
NIHR(Open Data)					
Age UK	https://www.ageuk.org.uk	Digital* Older People	N/A	N/A	1958
		Virtual*	N/A	N/A	119
		Assist* technology	N/A	N/A	720
NHS Blog	https://digital.nhs.uk/search?query=digital*+AND+%22Older+people%22	digital* AND "Older people"	2020, 2021, 2022	Published work chapters, News, Published work	162
	Search Results - NHS Digital	virtual* AND older people	N/A	As above	6
	https://digital.nhs.uk/search?query=technology+AND+%22Older+people%22	technology AND older people	N/A	As above	73
NHS Networks	https://www.networks.nhs.uk/	(digital* OR virtual* OR “computer assist” OR “computer assisted” OR “computer assistance” OR electronic OR "e-consultation" OR online OR remote OR video* OR "e-health" OR "m-health" OR telehealth OR “tele-health” OR telemedicine OR “tele-medicine”) AND (“older people” OR “older adult” OR “older adults” OR “older woman” OR “older women” OR “older man” OR “older men” OR ageing OR aging OR elderly OR seniors OR geriatric*)	N/A	News	2320

Nuffield Trust	https://www.nuffieldtrust.org.uk/search?search=digital+older+people&filters_type=search&contenttypes%5B%5D=research&years%5B%5D=2022&years%5B%5D=2021&years%5B%5D=2020&apply=	digital older people	2020, 2021, 2022	Research	27
	https://www.nuffieldtrust.org.uk/search?search=virtual+older+people&filters_type=search&contenttypes%5B%5D=research&years%5B%5D=2022&years%5B%5D=2021&years%5B%5D=2020	virtual older people	2020, 2021, 2022	Research	24
	https://www.nuffieldtrust.org.uk/search?search=technology+older+people&filters_type=search&contenttypes%5B%5D=research&years%5B%5D=2022&years%5B%5D=2021&years%5B%5D=2020	technology older people	2020, 2021, 2022	Research	25
	https://www.nuffieldtrust.org.uk/search?search=assist+older+people&filters_type=search&contenttypes%5B%5D=research&years%5B%5D=2022&years%5B%5D=2021&years%5B%5D=2020	assist older people	2020, 2021, 2022	Research	22

11. The Health Foundation	https://www.health.org.uk/search/topic/143/topic/154?textsearch=digital%2A&sort_bef_combine=search_api_relevance_DESC&sort_by=search_api_relevance&sort_order=DESC&page=5	digital*	N/A	Digital Technology, Older People	57
	https://www.health.org.uk/search/topic/143/topic/154?textsearch=virtual*&sort_bef_combine=search_api_relevance_DESC	virtual*	N/A	Digital Technology, Older People	22
	https://www.health.org.uk/search/topic/143/topic/154?textsearch=technolog*&sort_bef_combine=search_api_relevance_DESC	technolog*	N/A	Digital Technology, Older People	98
Healthwatch		"older adults" AND digital			228
Total					**8782**

Appendix 4: Full inclusion and exclusion criteria

Category	Inclusion	Exclusion	Reason
Population	People ≥65 years, mixed populations with a mean age of ≥65 years or includes people ≥65 who are identifiable as a separate group		The mapping review aims to address the question: What types of evidence are available / currently being sought on the digitalisation of health and care services for older adults during the COVID-19 pandemic? Therefore, we want to keep the population as broad as possible whilst focusing on older people.
Intervention	Publications which focus on the use of digital services, interventions, or ways of working in health and care Primary care or community settings, including interventions used to treat hospital patients at home	Publications focusing on the use of technology by solely staff of health and care providers Interventions used solely in hospital settings	Although staff use of technology during the pandemic is an important topic it is outside the scope of the current review. Interventions in the hospital inpatient setting are outside the scope of the review, but interventions treating hospital patients at home, i.e., in a 'hospital at home' / 'virtual ward' scenario, would be eligible.
Comparator	Any/none, as applicable (see 'study design')		As we will map a range of study designs, intervention studies where a digitalised service/intervention is evaluated against a comparator (e.g., usual practice pre-COVID-19) will be relevant, but other study designs that would not use a comparator will also be relevant.
Outcome	Any quantitative or qualitative		

	outcomes (clinical outcomes, quality of life); health care utilisation and cost-effectiveness; staff or patient experience; barriers and facilitators to use of digital approach, and any theoretical interpretive lens applied by researchers		
Study design/publication type	Evidence reviews - systematic and narrative Primary research: quantitative and qualitative Academic literature published in peer-reviewed journals or on pre-print servers Reports published by NHS, care organisations, charities and other relevant professional bodies delivering health and care services / interventions. Protocols or summaries of ongoing work published by major UK research funders Conference papers, conference proceedings, and symposia	Opinion pieces, newspaper and magazine articles Theses or dissertations	The inclusion of grey literature will allow a broader scope of services and interventions to be reviewed and enable interventions that have not been academically tested to be captured, thus also reducing publication bias. As this is a new and emerging area of interest, we will also include conference papers.
Date	Data collection of primary studies (and those within	Studies where data collection started before	Nationwide COVID-19 lockdowns were implemented in March

	any evidence reviews) must have occurred between March 2020 and May 2022. Studies where data collection started before March 2020 were included if the data collection period extended beyond March 2020.	March 2020 and extended beyond March 2020, but where the research question and findings do not relate to the impact of COVID-19 on change in practice.	2020, therefore any studies collecting data after this point will have been doing so in the context of the pandemic.
Study location	Peer-reviewed and pre-print academic literature: all locations Protocols, summaries and grey literature reports: UK only		We are interested in COVID-19 related digitalisation of services globally; this will allow us to map where the greatest number of studies have been undertaken thus far. For the grey literature and ongoing work, we will focus on the UK to map what is currently in progress nationally.
Publication language	English		Due to resource limitations, we are only able to focus on English language papers.

Appendix 5: Synthesis of evidence – gap maps

Data from the mapping review were synthesised to produce evidence gap maps using EPPI-Mapper[29] (c.f. page 18)

The full maps are available using the full URLs below.

Map A. UK Services and technology vs outcomes
https://eppi.ioe.ac.uk/cms/Portals/35/Maps/NIHRPRU/A_UKServicesandtechnologyvsoutcomes.html

Map B. Global Services and technology vs outcomes
https://eppi.ioe.ac.uk/cms/Portals/35/Maps/NIHRPRU/B_GlobalServicesandtechnologyvsoutcomes.html

Map C. UK Services and technology vs PROGRESS Plus collected
https://eppi.ioe.ac.uk/cms/Portals/35/Maps/NIHRPRU/C_UKServicesandtechnologyvsPROGRESSPluscollected.html

Map D. UK Services and technology vs PROGRESS Plus stratification
https://eppi.ioe.ac.uk/cms/Portals/35/Maps/NIHRPRU/D_UKServicesandtechnologyvsPROGRESSPlusstratification.html

Map E. UK Technology and outcomes vs PROGRESS Plus collected
https://eppi.ioe.ac.uk/cms/Portals/35/Maps/NIHRPRU/E_UKTechnologyandoutcomesvsPROGRESSPluscollected.html

Map F. UK Technology and outcomes vs PROGRESS Plus stratification
https://eppi.ioe.ac.uk/cms/Portals/35/Maps/NIHRPRU/F_UKTechnologyandoutcomesvsPROGRESSPlusstratification.html

NIHR | Policy Research Unit Older People and Frailty

This document is available in large print.

Please contact the NIHR Older People and Frailty PRU for assistance.

Email: pru-manager@manchester.ac.uk

Telephone: 0161 306 7797

MANCHESTER 1824
The University of Manchester

Newcastle University

CPEC
CARE POLICY AND EVALUATION CENTRE
Research at LSE