Global Evidence on the sustainability of telemedicine in outpatient and primary care during the first two years of the COVID-19 pandemic: a scoping review using the NASSS framework.

Daniela Valdes, Ghofran Hijazi, Ankit Shanker, Daniel Mensah, Tahir Bockaire, Ioana Lazar, Aishah Ibrahim, Hamid Zolfagharinia, Rob Procter, Rachel Spencer, Jeremy Dale, Armina Paule, Liam Medlin, Keerthana Tharuvara-kallottil

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Daniela Valdes[1] MSc; Ghofran Hijazi[2]; Ankit Shanker[3]; Daniel Mensah[3] PhD; Tahir Bockaire[3] PhD; Ioana Lazar[4]; Aishah Ibrahim[3]; Hamid Zolfagharinia[5]; Rob Procter[2] Prof Dr; Rachel Spencer[3] MD, PhD; Jeremy Dale[3] Prof Dr; Armina Paule[6]; Liam Medlin[7]; Keerthana Tharuvara-kallottil[7]

[1]Department of Computer Science University of Warwick Coventry GB
[2]University of Warwick Department of Computer Science Coventry GB
[3]University of Warwick Medical School Coventry GB
[4]University of Warwick Warwick Manufacturing Group (WMG) Coventry GB
[5]NHS Birmingham Community Healthcare Foundation Trust Research & Innovation Birmingham GB
[6]Warwick University Warwick Medical School Coventry GB
[7]University of Warwick Coventry GB

Corresponding Author:
Daniela Valdes MSc
Department of Computer Science
University of Warwick
University of Warwick
Coventry
GB

Abstract

Background: The rapid implementation of telemedicine during the early stages of the COVID-19 pandemic raises questions about sustainability of this intervention at global level.

Objective: Verify whether initial drivers of implementation support sustainability of telemedicine as a consultation medium once lockdowns and social restrictions ease, mapping findings against an established sociotechnical framework of technological adoption in healthcare.

Methods: Followed a published protocol against established Population-Concept-Context methodology for Scoping reviews, as follows. Population (any group)-concept (Patient experience/Clinician-patient relationship/Health Inequalities), context (telemedicine in primary/outpatient care). Searches were undertaken in academic databases and the web to capture world-wide grey literature in its original language between March 2020 until March 2022. Texts (academic abstracts or other text extracts) were screened by two researchers, following the latest data extraction guidance by the Joanna Briggs Institute. Abstracts and extracts were mapped against a sociotechnical healthcare technology adoption framework.

Results: 134 texts met our criteria, of which 27.6% had no structured abstract. The texts identified had a global scope. According to the protocol's Population-Concept-Context criteria we found 49% reported no specific population group, with population groups split by age and sex in 29% and 14% of texts respectively. Concept-wise, 42% combined two of the concepts studied, while 21% touch upon Clinician-Patient relationship only, 19% on patient experience only, and 8% on health inequalities only, with the remainder combining all three. The context identified that 55% of texts referred to what in the UK would be an outpatient (ambulatory care) setting and 34% to Primary Care. Patient experience reflected positive patient satisfaction and sustained access at the time of lockdowns. Clinician-Patient Relationship was more nuanced and reflected impacts on the interaction and quality of the encounter. We found gaps in evidence which made it difficult to pinpoint impacts on health inequalities on specific groups, with some evidence on negative impacts on those at the fringe of social and health systems. Mapping to the NASSS framework identified 93% of texts had a reference to the sustainability of the innovation with moderately positive comments. Over half of texts (56%) identified challenges in terms of sustainability or made recommendations on how to address them. 28% had a generally positive outlook setting out plans for growth and further embedding, while the remaining texts either did not address sustainability (11%) or did not support it (4%). We found gaps in evidence on clinical conditions,

outcomes and digital skills.

Conclusions: The sustainability of telemedicine is less clear once lockdowns ease, despite patient satisfaction among those with completed consultations and cautious optimism from clinicians. Additional research needed on the healthcare experience of those disenfranchised telemedicine due to socioeconomic deprivation and limited healthcare insurance. Clinical Trial: Study has been registered on Open Science Framework (4z5ut).

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Global Evidence on the sustainability of telemedicine in outpatient and primary care during the first two years of the COVID-19 pandemic: a scoping review using the NASSS framework.

Abstract

Objectives: This research examines patient experience, health inequalities, and clinician-patient relationship in telemedicine during the COVID-19 pandemic's first two years, aiming to identify sustainability factors.

Methods: Based on a pre-published protocol using the Joanna Briggs Institute (JBI) methodology for scoping reviews. We included academic and grey literature between March 2020 and March 2022 according to these criteria: (1) Population - any group; (2) Concepts - Patient experience/Clinician-patient relationship/Health Inequalities; (3) Context - Telemedicine in primary/outpatient care; (4) Exclude studies pertaining surgery, oncology and (inpatient) psychiatry. We performed searches on Ovid Medline/PubMed (13/01/2022), Web of Science (19/03/2022), and Google/Google Scholar (Feb-March 2022) and others. Risk of bias was not assessed as per guidance. The analysis table analysis of the texts, and a color-coded tabular mapping against a healthcare technology adoption framework to identify sustainability (using double-blind extraction).

Results: Of the 134 texts that met our criteria, 49% reported no specific population group. Concept-wise, 42% combined two of the concepts studied. The context analysis identified that 55% of texts referred to what in the UK would be an outpatient (ambulatory care) setting and 34% to Primary Care. Patient experience reflected positive satisfaction and sustained access during lockdowns. Clinician-Patient Relationship impacts were nuanced, affecting interaction and encounter quality. When Mapping to the NASSS framework, 81% of texts referenced the innovation's sustainability. While overall positive, there were some concerns on sustainability based on quality, ehealth literacy and access to healthcare for vulnerable migrants and the uninsured.

Discussion: We identified confusion between the concepts of patient experience and patient satisfaction, so future research could focus on established frameworks to qualify the patient experience across the whole pathway and not just the remote encounter. As expected, our research found mainly descriptive analysis so there is a need for more robust evidence methods identifying impacts of changes in treatment pathways. The study illustrates modern methods to decolonise academic research by using grey literature extracts in other languages. We acknowledge the use of Google for identifying grey literature at global level and in other languages has implications on reproducibility. We did not consider synchronous text-based communication.

Funding: The main researcher of this study is a self-funded PhD student at the University of Warwick. No external sources of funding were used.

Registration: The study has been registered on Open Science Framework (4z5ut).

Keywords: Pandemic; Primary care; Telemedicine; Ambulatory care, Technology adoption, Telehealth, Global Health

Introduction

Following the World Health Organization's announcement on 11 March 2020 declaring Covid-19 a pandemic, the organization recommended telemedicine as one of the first critical interventions to minimize demands on stretched supplies of personal protective equipment [1,2]. While telehealth was not new as a delivery mode, there were great expectations particularly around the use of video consultations in this context. In Africa, where telemedicine held promise as it rationalized human resources allowing national or international experts to relay advice to other clinicians [3], to the UK, where the pandemic was deemed a 'burning platform' to propel the UK National Health Service (NHS) towards widespread adoption of video consultations [4]. Most medical specialties responded to the above WHO recommendation with rapid changes in service delivery towards telemedicine (both telephone and a new medium - video consultations) in primary and secondary care across the globe.

In the United Kingdom, fifteen months into the pandemic, the academic community and political groups raised questions around sustainability and impacts of the move towards telemedicine, building upon the learning of the past year towards a 'new normal', particularly as social distancing/ lockdown measures are removed [5]. A 2021 report by the UK Health and Social Care Committee defined telemedicine as 'welcomed and positive innovation' overall, while highlighting concerns by various national organizations on its impact on health inequalities both in terms of exclusion (lack of access), quality and patient safety. The Committee reports an important consensus from recognized local institutions such as the Health Foundation, the Kings Fund and patient organizations such as National Voices and Healthwatch on the need of additional research to assess the future of telemedicine in a patient-centered way. [6]

In a previous protocol [7, 17] we relayed how pre-pandemic evidence synthesis identified several barriers and objections that hindered telemedicine uptake, including technology, workload and confidentiality [8], as well as concerns regarding appropriateness [9]. However, at the outset of the pandemic these objections were rapidly overcome, supported by major regulatory and financial enablers [10], [11]. Given the considerable incentives and support towards implementation of telemedicine, there are concerns around the risks of losing some of the advantages of this mode of delivery in a post pandemic future [12], particularly once incentives are no longer in place [13], [14]. These concerns apply not only to the United Kingdom, Canada or the United States, but also Sub-Saharan Africa [15] and Latin America [16] where considerable barriers persist and there has been more limited evidence of uptake.

The purpose of this scoping review was to explore the global evidence (both academic and non-academic) surrounding the rapid adoption of telemedicine in outpatient and primary care settings during the first two years of the COVID-19 pandemic to identify how elements related to patient experience, patient clinician interaction and health inequalities support (or takes away from) the sustainability of this delivery model.

Methods

This review was conducted according to a priori published protocol [17] following the Joanna Briggs Institute (JBI) methodology for scoping reviews, updated guidance and data extraction guidance [18,19, 20, 21]. This last guidance clarifies can focus on the most relevant section of a document for

their analysis, without having to review whole studies in scoping reviews [21]. We outline deviations from the original protocol and the methodology in Section (Appendix I). A key contribution of the present study hinges on the methods used to search and extract grey literature across a wider set of countries as to achieve truly global representation.

Inclusion criteria

The inclusion criteria used the Population-concept-context (PCC) principle. We classified each text against the Population-Concept-Context framework. Namely, for each text we sought to identify: (i) which population group (if any) was the text referring to, (ii) which concept it referred to (Patient experience, Clinician-patient relationship, Health Inequalities or a combination of these) and (iii) in which (clinical) context telemedicine was being used (Outpatient, primary care, or particular specialties).

Population: The review focused on primary care services offered to the general population. Studies focusing on specific population groups or those suffering from particular conditions within a particular country or geographical area were included.

Concept: While the key concept under consideration is the adoption of 'telemedicine', as defined above, we narrowed our inclusion criteria on the sustainability of the interventions, focusing on patient experience, health inequalities and patient-clinician relationship. Telemedicine has been defined as per our protocol [17] using academic literature [22] and the World Health Organization [23] which defines it as *"The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies [...]* ". While we focus on telephone and video as communication technologies, we thank an anonymous peer reviewer in identifying text messaging also classifies in this category (albeit not included in our review).

Context: The context is primary care services provided during the COVID-19 pandemic in any setting or country during the first 2 years of the pandemic (March 2020-March 2022).

Types of sources: This scoping review considered quantitative, qualitative and mixed methods study designs for inclusion. In addition, systematic reviews, protocols, other text and commentary/opinion documents were considered for inclusion in the proposed scoping review. These commentaries or other documents might have appeared in peer-reviewed journals, or other grey literature such as industry magazines or reports [24,25].

Search Strategy

This section summarises our pre-published protocol [17]. We structure this section by first explaining the selection and identification of search terms (both in English and other languages), and then how we used those terms to search for academic and grey literature. To note, the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols Extension for Scoping Reviews) [26] was used to structure our review protocol [17].

Identifying search terms

Our search terms in English, centered around telemedicine, primary care, and COVID-19, were expanded through a limited search on Ovid Medline and Web of Science. We also sought guidance

from Warwick Librarians, who identified COVID-19 search terms from NICE [27]. Additionally, we examined previous telemedicine protocols in general practice [28] and Primary Care Cochrane Library Protocols. For search terms in other languages, we employed a two-step process to identify relevant terms for the included non-English search results. First, we used Google Translate and engaged in discussions with native speakers to ensure these were accurate translations.

Search approaches

We had two distinct approaches depending on searching for academic or gray literature. With the above terms, we searched the following academic databases: Ovid Medline (equivalent to PubMed [29]), Web of Science, Google Scholar. PROSPERO and Cochrane Library were used to inform our design. PROSPERO in particular was used to check whether there was any ongoing review in the topic. All identified search terms and examples of the searches (for academic and gray literature) can be found in Appendix III, as per our previously published protocol [17].

We performed searches on Ovid Medline/PubMed (13/01/2022), Web of Science (19/03/2022), Livivo (15/03/2022), Scopus (19/03/2022), PROSPERO (12/01/2022), Cochrane Library (12/01/2022) and Google/Google Scholar (Feb-March 2022).

As shown in Appendix III, to identify relevant grey literature published at the time of the pandemic, we used advanced Google search criteria with simplified search terms. We combined the terms telemedicine; 'Primary Care'; COVID-19 with either (1) "patient experience"; (2) "health inequalities"; (3) "patient-clinician interaction" and asked the search engine to provide pdf-only results within the years 2020-2022. While we recognise it is not fully possible to reproduce Google searches, the selection of PDF documents is aimed at identifying the most retrievable and credible gray literature [17] while at the same time supporting reproducibility of the analysis [24, 25].

We undertook these searches in English, Chinese, Spanish, Arabic, Portuguese, Hindi and Indonesian. To improve representation of African countries due to difficulties in searches in Urdu), we undertook additional Google searches in English including country-specific results for the five largest African countries by population (Nigeria, Ethiopia, Democratic Republic of Congo, Egypt and South Africa [38]). For Google searches, we selected the first 30 results by relevance, and for English-based results by country, we selected the top 10 results. We selected the first 30 results based on the literature [39-42], timeline and budget for the. Further, as can be seen in the example for a failed search for Pakistan in Appendix III, Google searches only provided less than a handful of results when restricting by country of publication.

We followed established guidelines for analyzing non-English texts [31]. We used Machine translation via Google Translate to translate at least three paragraphs containing the key search terms (telemedicine, primary care, and any of combination of patient experience/patient-clinician relationship/health inequalities). We selected 3 paragraphs as roughly equivalent in number of words to an abstract.

Screening

The authors used a single-phase, double-blind screening of abstracts and extracts based on the eligibility criteria. Four of the authors tested screening instructions across a sample of 50 abstracts to verify the instructions had been properly understood. The remaining articles were allocated across several combinations of pairs of authors, using double-blind screening and Rayyan [43] as an aid. Any discrepancies were resolved by the pair of authors themselves and verified by the lead author before data extraction. Given the extended scope of our review, and in agreement with the pre-published protocol and the latest JBI guidance [21], there was no full-text screening as the abstracts/extracts are our main data source. Abstracts/Extracts have been made available as part of this submission as multimedia appendixes.

Data extraction

The authors used double-blind extraction of data using an Excel table template as outlined in the appendix. Following the latest JBI guidance for scoping reviews [21] we have chosen to focus data extraction on abstracts and extracts only, reflecting the wide research design which allows us to accommodate the breadth of the review (i) in terms of themes; (ii) world-wide/multi language approach, and (iii) sources. Using a data extraction tool shared in the additional documentation, we mapped the text in tabular form against the NASSS framework [45] domains noting some of the document sections might touch upon one or more domains.

Data analysis and presentation

In agreement with the latest JBI methodological guidance [44, 20, 21], no critical appraisal was undertaken, and the final presentation of results consist of the following:

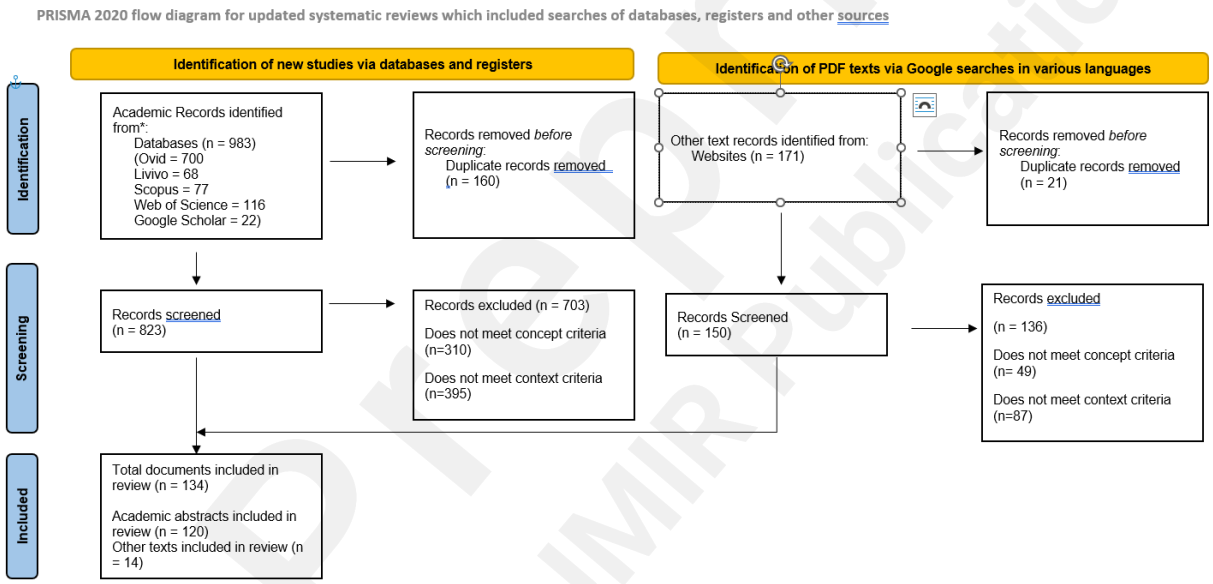
1. In the first section, the results of the search were presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses for Scoping Reviews (PRISMA-ScR) flow diagram [26], including a flowchart and a checklist (supplementary files).
2. Table analysis of more detailed characteristics of the texts included (Appendix II).
3. We captured the number of articles that included certain data against the PCC (Population-Concept-Context) framework. Understandably, in the 'Population' label numbers do not add to the total as some categories are not mutually exclusive.
4. A color-coded ('Heatmap') mapping in tabular form against the NASSS framework's [45] domains *(i- the condition*, *ii- the technology*, *iii- the value proposition*, *iv- adopters*, *v- organizations*, *vi- wider system and vii- embedding and adaptation over time)*. The heat map shows graphically the maximum and minimum number of references for each domain (using the average counts for double-blind data extraction and mapping).
5. Narrative analysis (including sentiment analysis) of references to sustainability of video-consultations outside of social distancing restrictions brought about by the pandemic.
6. Results are discussed from the point of view of Sociotechnical Grounded theory, providing strengths and limitations of the sources and the review method itself.
7. We include a statement of positionality in our conclusions, recommendations for research and practice. We believe that reflexivity through researcher positionality is fundamental in decolonizing global health research that seeks to include voices and perspectives usually marginalized from the academic discourse [46-48].

Results

1. PRISMA Study inclusion

Academic database searches identified 983 records, 171 additional records identified through Google searches for various languages and countries. For Google Arabic and Google Pakistan there were no results that matched the search criteria. Of the total of 1154 articles, 181 were identified as duplicates and were removed. 160 duplicates were in the academic articles and 21 duplicates were identified among the non-academic articles. After the removal of duplicates, there were a total of 973 articles to be screened. Of these 973 articles, 823 articles were from academic databases and 150 were from non-academic databases. After the abstract screening and before data extraction, 703 academic and 136 non-academic articles were excluded. Leaving a total of 134 documents [32–38], [49-174] for data extraction including 120 academic and 14 extracts from grey literature searches. See the PRISMA-Scr [26] flowchart (Figure 1)

Figure 1. Prisma-Sc flow chart



Caption: Prisma flow chart outlining the process of identification, screening and final inclusion across various types of data sources.
[Note to the editor, insert figure 1 here]

2. Summary of document types

We split between academic studies (which we identified as those having clearly labelled abstract with introduction/aims/methods/results/discussion), and other documents (or grey literature) and found that these other documents represented 27% of the selected texts. Searches in academic databases and journals provided a small group of grey literature in the form of commentaries or guidelines. Conversely, general internet searches also identified a minority of academic documents.

The document pool achieved global representation with documents from all continents, including South America [49,113,169] and Africa [119,124]. There is, however, over-representation from

North America (43%), with a large proportion of documents from the USA.

In terms of the methodology in the documents selected, over 72% of documents used surveys, questionnaires or interviews. The use of surveys and questionnaires is closely related to the type of design observed, with most studies being cross-sectional (72%). Finally, on the telemedicine medium discussed, the documents do not generally specify the medium by generally referring to 'telemedicine' in 57% of documents. More details are provided in Appendix II.

3. Quantitative classification against the Population-Concept-Context framework

Appendix II includes the characteristics of the 134 documents against the protocol's Population-Concept-Context. We follow with a short commentary highlighting any texts that exemplify these findings. Table 1 below shows how documents related to the various key concepts explored (Clinician-Patient relationship, Health inequalities, and Patient experience), and the section below summarises key findings.

Table 1. Classification of the documents against the key concepts

Concept			
	One Concept		
		Clinician-Patient relationship	28
		Health inequalities	11
		Patient experience	26
	Two concepts		
		Clinician-Patient relationship Health Inequalities	11
		Clinician-Patient relationship Patient Experience	29
		Health Inequalities Patient experience	16
	All three concepts		
		Clinician-Patient relationship Patient experience Health inequalities	13

Legend: Table outlines the breakdown of documents covering one, two, or three of the concepts covered in the scoping review. For instance, 28 documents focused on clinician-patient relationship.

In terms of Population groups, a large subset of abstracts/extracts (66 out of 134) reported no specific demographics or patient characteristics (see for example the extract from the Board report by East Kent Hospitals NHS Foundation Trust, 2021 [67], or Karacabeyli et al. , 2020 [98]). The main demographic characteristics reported in abstracts/extracts respond to age and sex (39 and 20 respectively), with studies also considering socio-demographic factors. It is important to note that a particular document might track more than one characteristic, see for example Manski-Nankervis et al. 2022 [116], which tracks education status, gender, age, and whether patients speak English at home.

In terms of the Concepts studied, the most popular concept is the clinician-patient relationship with 28 abstracts. The majoriry of documents combine two or three concepts (69 in total). Below we provide a brief summary of results across the various concepts.

- **Patient experience.** We found 26 studies solely focused on this concept. Patient experience was mostly equated with patient satisfaction and access. There were positive levels of satisfaction overall [102,124,152] and sustained access at the time of lockdowns [51,56].
- **Health inequalities.** There were only 11 studies solely focused on this concept. We found gaps in evidence which made it difficult to pinpoint impacts on health inequalities on specific groups, with some evidence of exacerbating of health inequalities for those considered to be at the fringe of the economic and health system (such as vulnerable migrants, families with high levels of economic deprivation/healthcare insurance exclusion, or rural communities with limited access to technology) [77,119,143].
- **Clinician-Patient Relationship.** There were 28 documents solely focused on this concept, mainly on the clinician-patient interaction and quality of the encounter. There was no consensus regarding whether the impact of telemedicine on the interaction had been positive, neutral or negative [35,59, 73] while there was consensus on the added value in the quality of the remote encounter for triage, follow-up consultations or chronic condition management) [131,136,158].

Finally, concerning the context, we identified 46 documents focused solely on Primary Care; general outpatient care featured in 19, while various outpatient specialties featured in 56 extracts.

4. Mapping against the NASSS framework

As shown in Figure 3, there is considerable variability in evidence across NASSS [45] domains and sub-domains.

Domains 6 (Wider system), 7 (Time domain) and 3 (Value proposition) had the most information. For domain 6, texts referenced the pandemic or pandemic-related lockdowns, infection control measures coupled with regulatory enablers/recommendations (such as mandatory online triage in primary care, parity in payments between face to face and telemedicine appointments). There was lower density of information about specific conditions that were being managed with telemedicine (sub domain 1a), knowledge needed to use telemedicine (2c), and organizational/implementation aspects (Domain 5)

[Note to editor please include Figure 3 around here]

Figure 3. Heatmap against each of the NASSS domains

NASSS Domain		NASSS Mapping
Domain 1 Condition	1. Condition/Illness/ Multimorbidity.	49
	1a. Sociocultural factors	74
Domain 2 Technology	2. Technology description	72
	2a. Technology performance and and dependability	62
	2b. Technology knowledge/data created by it (including usability/acceptability)	76
	2c. Technology - knowledge to use it.	57
	2d. Technology requires major changes to service/patient tasks and routines	68
Domain 3 value Proposition	3a. Supply-side value (for clinicians/provider)	92
	3b. Demand-side valude for patients	90
Domain 4 Adopters	4a. Staff (if reported)	70
	4b. Patients (if reported)	84
Domain 5 Organisation	5. Organisations/Capacity to innovate in general/ Readiness-Pace of adoption	65
Domain 6 Wider system	6. Wider system/Political-Policy context/Regularory-legal issues/Professional Bodies/Sociocultural context/Interorganisational networking	103
Domain 7	7. Embedding and adapting over time/Scope for adaptation over time/Organisational resilience.	108

Key	
Lowest in rank	49
20-40%	61
40%-60%	73
60%-80%	84
80+ and above	96
Highest in rank	108

Legend: Heat map in table form showing the frequency of references in each document found against each of the NASSS framework [45] domains using double-blind data extraction.

5. Narrative analysis of sustainability

Roughly over half of the texts (75) identified challenges in terms of sustainability and/or made recommendations on how to address them. Among these, sentiment was mixed/neutral in 40 texts and positive in 31, with only a small sub-group [71,92,144,151] viewing such challenges negatively as barriers to further planning and progress. Challenges and areas of consideration included general planning such as workforce training, digital resources, patient experience and ethical issues [95], or a more focused look at the technology itself such as more effective digital platforms and increased use of home medical equipment [35]. Other issues such as patient selection were also noted with consideration to disease progression, language and cognitive ability, health literacy and technology access [32]. Mbunge et al. 's 2022 [119] systematic review of the digital technologies deployed in South Africa during the pandemic identifies a 'digital divide' barrier in rural areas and advocates for better networks.

Almost a third (28%) of texts had set out plans for sustainable growth and further embedding, with generally positive sentiment. The text by East Kent Hospitals NHS Foundation Trust in 2021 [67] mentions an enhanced engagement plan to meet ambitious targets set by healthcare authorities for the delivery of telemedicine appointments. Tulupova et al. (2021) [165] referred to plans for creation of Telemedicine guidelines and an educational programme on communications in healthcare using digital technologies for patients to improve digital health literacy. The remaining texts either do not address the area of sustainability [34,36,52,69,98,104,109,113,114,125,135,146,156,170] or have a general negative view on the sustainability of the intervention [66,77,83,115,172]. The negative commentary is based on concerns on quality (i.e. treating musculoskeletal conditions), ehealth literacy and access to healthcare for those at the fringe of the healthcare system coverage (such as vulnerable migrants and the uninsured).

Discussion

This section includes four main areas. A summary of our results, a socio-technical grounded theory research interpretation of the findings (based on Hoda, 2022 [178]), positioning against the wider and recent literature, as well as strengths and limitations of our study. The section finalizes with a small conclusion.

Summary of results

Concerning the protocol's Population-Concept-Context:

- Population: 49% of documents reported no specific population group targeted in the study.
- Context: 55% of texts referred to what in the UK would be an outpatient (ambulatory care) setting and 34% to Primary Care.
- Concept: 49% of the texts refer to a single one of the concepts studied.

Mapping to the NASSS framework [45] identified 93% of texts had a reference to the sustainability of telemedicine with moderately positive comments.

Global representation

We found 134 texts meeting our criteria and achieving global representation. We highlight some global results from developing countries below.

- Despite the limited evidence for African countries (2 studies [119,124]), our findings were

aligned with other African reviews around insufficient evidence of usage due to considerable barriers in this region [15], and lack of 'meaningful investment' in this area [195]. Nittari et al. [196] concur with us that several barriers are still present which would risk sustainability of this delivery mode beyond the pandemic.

- South American documents [49, 113, 169] provide examples of effective use in outpatient settings (specifically speech and language therapy [49]), as well as reflections on how this new delivery mode in the context of the wider pandemic might have generated an element of mistrust and fear in the patient-clinician relationship [169].
- Results from Middle Eastern and Asian countries [33, 107, 108, 100] provide perspectives of the use of telemedicine in Orthopaedics and Haematology, while indicating the equivalence of audio and video consultations, an important point to inform telemedicine programmes in low income countries as a way of increasing access to health services.

Positioning against the wider and recent literature

This review can be positioned in the emerging literature of reviews around telemedicine during the pandemic period [180,183–189, 210].

A key finding of our study is how patient experience was generally equated with patient satisfaction. Other studies have found these are often used interchangeably ([190-192]). However accepted definitions of patient experience go beyond satisfaction and *'focus on individualized care and tailoring of services to meet patients' needs'* [193]. This is related to another finding as the studies are mainly observational with no reference to patient experience frameworks, let alone with some emerging frameworks specific to digital patient experience [194,195]. Our findings on patient experience are aligned with another recently published review focused on the Covid-19 pandemic, with similar categories and findings [185]. In terms of the clinician patient relationship, our findings were mixed but recent reviews found that the relationship was 'troubled' telemedicine given reluctance to use from both patients and clinicians [184], while others found the tool useful [213].

De Oliveira Andrade et al. [180] focus on the role of legislation in the widespread utilisation of telemedicine during the pandemic, regulatory frameworks enabled telemedicine spread, in areas related to ethics, reimbursement, data safety as well as pandemic-related regulatory relaxation (in the US for instance relaxation of interstate practice was particularly relevant [210]). We find a lack of consensus in terms of sustainability as these financial and regulatory incentives dissipate, however, supportive regulation would be a defining factor in its sustainability. Our evidence seems more nuanced than other recent reviews [184,197]. We are aware specialities like family medicine/general practice seem to have preference towards a particular medium, such as telephone instead of video [198], with more work being undertaken regarding the impacts on quality [199] or equivalence between face-to-face and remote consultations [210].

Regarding the impacts on health inequalities, another review identified emerging literature of opinions of vulnerable populations regarding telemedicine [187]. We see references [200-203] to an emerging framework for Digital Health Equity [204], which we expect will help address the gaps we identified in the design and evaluation of inclusive digital healthcare services, to address the 'self-reinforcing effect of digital and social exclusion' [205] and its impact on healthcare inequalities in access and experience. Our concerns about implications on health inequality resonate with other

similar reviews for telemedicine [186].

Strengths and limitations

Strengths

We have mapped the emerging literature (grey and academic) on telemedicine during the pandemic to a well-established framework, using three lenses (patient experience, health inequalities and clinician-patient relationship). We identified this is the only systematic review of its kind. Only one other mapped academic literature on video consultations to the NASSS framework [45] but outside the context of the pandemic [206]. Notably, we have effectively reflected experiences of non-English speaking countries with literature across the five continents, so it's truly Global Health-oriented, with the added values and perspectives of a diverse, multidisciplinary research team.

When identifying the limited literature at the intersection of health inequalities and telemedicine, we have provided a brief taxonomy of potential groups impacted differently. Recognising the multi-dimensionality and intersectionality of social exclusion, we show that demographic characteristics such as age, sex and socioeconomic factors have had some attention but there is still very limited information and not enough to draw solid conclusions on impacts.

From a methodological standpoint, we have provided additional insight on how to integrate effectively other texts and non-traditional voices and experiences into academic research with a reproducible approach.

Limitations of the sources

The authors sought grey literature directly via Google to ensure a unified source and methodology to identify and capture experiences from non-English speaking countries. This is a method with limited reproducibility. Researchers interested in grey literature information in English can consult the UK National Grey Literature Collection Funded by Health Education England. We are aware of additional, non-English speaking literature databases that could be used [30]. Emerging literature has covered mostly single-centre survey studies with limited sample numbers, reflective of immediate experiences arising in the context of the pandemic.

Limitations of the review

We have limited the depth of analysis to accommodate for the extensive scope, in accordance to the Joanna Briggs Institute Guidelines for data extraction [20]. The use of document extracts using the 'surrounding keyword' approach needs further development and testing as we recognize slightly longer extracts are better at conveying enough information to support screening and analysis. We did not consider synchronous text-based communication. The methodology of scoping reviews is still skewed towards evidence from academic publications which are biased towards researchers from North America and Europe. While not specified in the current guidance, capping the number of results from traditional academic databases provides a more balanced representation, and could reduce duplication, while having limited effects on how comprehensive the findings are.

In conclusion, our discussion section has highlighted considerable variation in the emerging literature during the pandemic regarding changes in pathways towards telemedicine. We have highlighted the different focus of studies focused on health inequality, or outpatient care and the global representation of the studies included (which is a key strength). Of note is the finding equating patient experience with satisfaction, which reflects a potentially limited understanding of socio-technical views of human-computer interaction/human factors in traditional health service research.

Acknowledgments

As this article is also a pedagogic exercise related to various individuals' studies, it was agreed that all voluntary contributors would be set as co-authors regardless of the degree of contribution.

ChatGPT and Grammarly were used for final draft editing. Many thanks to Cee MacDonald at Paperaid with extract retrieval and text formatting.

This research did not receive any external funding and was undertaken as part of DV's self-funded PhD studies.

Conclusions

This section is divided into three parts, comprising a reflection of our positionality as researchers in analyzing these themes, as well as further recommendations for research and practice.

Statement of positionality

Following Pant et al. (2022) [207] we frame some of our conclusions in the context of our positionality and our aims. We are a diverse group of researchers (with roots in Latin America, the Middle East, Asia, and Africa with supervisors from the United Kingdom), but our gaze is colonially influenced by our education and current positionality in this country.

By opening our search criteria to non-English texts and grey literature we succeeded in capturing immediate, emerging experiences at global level, with 27.6% of our texts with no structured abstract and classified as grey literature, 5 texts from South America and Africa and 13 from Asia. The balance, however, is still very skewed towards the USA and English-speaking countries.

Our positionality and knowledge of the UK health system and legislation meant it was difficult to translate these categories to other systems and had to modify our parameters and analysis. For instance, while our choice of the United Kingdom diversity legislation ('protected characteristics') as a framework for categorizing health inequalities was helpful, the UK definition of 'Primary Care' contrasted by that set out by the World Health Organization was not (for example in the work by Dimer et al. 2020 [49] in Brazil, classifying Speech and Language Therapy services as 'primary healthcare service', not available in the United Kingdom in this setting).

Recommendations for research

From a methodological standpoint, we urge researchers looking to decolonize academic research to

test and evaluate further our approach to using grey literature extracts in other languages, particularly in scoping reviews as it provides that additional level of immediacy with the phenomenon of study. We noticed confusion on the use of patient satisfaction and patient experience so research should focus on more robust frameworks reviewing the overall patient pathway (away from the evaluation of a remote encounter [190-192]). As expected, our research found mainly descriptive documents so future research should focus on robust evaluation of clinical outcomes arising from changes in diagnostic and treatment pathways away from face-to-face settings. We recommend future research with a narrower approach, to specific population groups and more focused on access and outcomes (Appendix II). From a socio-technical research perspective, we recommend future research using modern techniques (natural language processing, data mining and sentiment analysis) focusing on categories with closer links to human-computer interaction. Following publication we will publish our data on Open Science Framework (reference: 4z5ut).

Recommendations for practice

The impact of telemedicine in patient safety is critical to determine the sustainability of this intervention when contrasting it with the under/overutilization of resources [208]. If not ruling out the continued use of telemedicine, authors outlined the importance of further research and refinements in the intervention itself. We found that models such as the Dynamic Sustainability Framework [209] might be useful to support learning and adaptation with care towards the potential disenfranchisement of some patient groups.

Author contributionsThese contributions use CRediT Taxonomy guidelines. As this article is also a pedagogic exercise related to various individuals' studies, it was agreed that all voluntary contributors would be set as co-authors regardless of the degree of contribution.

Daniela Valdes: This article contributes to DV's PhD studies at the University of Warwick. Conceptualisation, Data Curation (lead), Formal Analysis (lead), Investigation (lead), Methodology (lead), Project Administration (lead), Software, Validation, Visualization, Writing – Original draft preparation (lead), Writing – Review & Editing (support). Ghofran Hijazi and Hamid Zolfagharinia: Formal analysis (support), Visualisation (support), Writing – Original draft preparation (support). Ankit Shanker: Data Curation (lead), Formal Analysis (support), Investigation(support), Methodology (equal), Project Administration (support), Software (support), Visualisation (support), Writing – Original draft preparation (support). Dr Daniel Mensah and Ioana Lazar: Data Curation (support), Investigation(support), Methodology (equal). Dr Tahir Bockarie: Data Curation (support), Investigation(support), Methodology (equal), Writing – Review & Editing (support). Aishah Ibrahim: Data curation (support), Formal analysis (support), Methodology (support). Rob Procter: Supervision (lead), Validation (lead), Writing – Review & Editing (support). Rachel Spencer: Supervision (support), Writing – Review & Editing (lead), Validation (lead). Jeremy Dale: Supervision (support). Armina Paule: Validation of data extraction (support), Writing – Final draft preparation (support), Liam Medlin and Keerthana Tharuvara-Kallottil: Data curation (support). Many thanks to Cee MacDonald at Paperaid with extract retrieval and text formatting.

Conflicts of Interest

At the time of publication, DV, TB and HZ worked in the UK National Health Service in the United

Kingdom. The research was undertaken independently of DV's, TB's and HZ's occupations and does not represent the views of their employers. The remaining authors declare no conflict of interest.

This research did not receive any external sources of funding and was undertaken as part of DV's self-funded PhD studies.

Abbreviations

NASSS: Nonadoption, abandonment, scale-up, spread and sustainability
Other abbreviations relate to author's initials.

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Appendix I: Deviations from protocol

Area	Deviation	Rationale
Key definitions	Concept: Include outpatient care	Alma Ata Declaration [17] coupled with British-Based definition of Primary Care (General Practice) does not translate directly in a Global Health, hence the need of extending to outpatient/ambulatory care. Multi-disciplinary element now present in general practice implies setting exclusion boundaries at specialty level about surgical procedures, oncology and (inpatient) psychiatry
Key definitions	Concept: Patient-Clinician Relationship	Expanded to include the wider clinical relationship
Key definitions	Context: Healthcare setting	Include Primary care practice, primary care, family care, ambulatory/outpatient care. Include physiotherapy, dental and pharmacy. Exclude. As above setting exclusion boundaries at specialty level about surgical procedures, oncology and (inpatient) psychiatry.
Screening	Use of a prioritisation template	Given remote team working at different times, DV, AS, IL, DM, TB tested a screening template by reviewing a random selection 50 documents, split between academic abstracts and extracts. AS developed s subsequent conflict resolution protocol to address any discrepancies in inclusion/exclusion decisions across pairs of researchers. Not all reasons for rejection were included across both types of document, so we calculated the ratio of rejections against each of the criteria and extrapolated to the total.
Searches	Urdu searches	We found no results in Urdu, and were unable to find results in English but focused in Pakistan (see Appendix III).
Screening	Use of automated prioritization tool	Not used due to logistical considerations.
Data extraction	Extraction template reflecting NASSS framework [45] sub-domains	Extraction template developed by IL, DM and DV is included as a multimedia appendix As a result of IS' review, we noted that the simplified NASSS framework [45] picture outlined Domain 3 as a 'supply value proposition' focused on the developers of the technological tool. When reviewing Greenhalgh and Abimbola (2019) [9] it was noted that Domain 3 also pertains to the wider system. We used this distinction to separate the 'clinician/provider-based value' and 'patient-

		based' value, noting there were no references to developers of telemedicine tools among the abstracts/extracts.
Data extraction	Double-blind extraction	A second reviewer (DV and AP) scanned 10% of the selected articles at random to identify missing areas; additional review was undertaken as part of the analysis phase, by re-scanning the extracts to confirm the extraction against particular domains.
Analysis	Analysis in tabular form	The NASSS framework [45] table is constructed as a 'heat map'.

Appendix II: Summary Characteristics of Included Studies

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
East Kent Hospitals NHS Foundation Trust 2021	Not specified - assume the general population	Clinician-Patient relationship Patient Experience	Primary care and outpatient
European Union 2020	Not specified - assume the general population	Health inequalities	Primary care and outpatient (also hospital care and social care)
Karacabeyli et al. 2020	Not specified - assume the general population	Health Inequalities Patient experience	Substance misuse
Royal College of General Practitioners 2020	Elderly patients in nursing homes	Health inequalities (also doctors returning to the workforce)	Primary Care
National Committee for Quality Assurance (NCQA) 2020	(Minority) ethnic communities	Clinician-Patient relationship Health Inequalities	Primary Care
Ruhm (Editor) 2021	Socioeconomic population groups	Health inequalities	Primary Care
Mbunge et al. 2022	Urban/Rural	Health Inequalities	Various (including teledermatology, teleradiology, telecardiology, teleophthalmology, teleneurology, telerehabilitation, teleoncology)
Jonnagaddala et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient experience Health inequalities	Primary Care
Philips UK 2021	Socially deprived population groups	Health Inequalities	Primary Care
Li et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Primary Care
Tulupova et al. 2021	Digital health literate/illiterate population groups	Clinician-Patient relationship Patient Experience	Primary Care
Dimer et al. 2020	Children and adults	Clinician-Patient relationship Health Inequalities	Speech and language therapy
Hardcastle and Ogbogu 2020	Urban/Rural	Clinician-Patient relationship Health Inequalities	Primary Care
Bergman et al. 2020	Not specified - assume general population	Clinician-Patient relationship	Primary care
Triantafillou 2020	General population split by demographic characteristics	Patient experience	Otolaryngology
Srinivasan 2020	Not specified - assume general population	Clinician-Patient relationship	Primary Care
Belenkiy 2020	Not specified - assume general population	Patient experience	Specialised trauma care
O'Neill et al. 2022	Not specified - assume general population	Clinician-Patient relationship	Outpatient care
Hofmann et al. 2022	Maternity status (pre/post natal)	Clinician-Patient relationship Health Inequalities	Maternity care
Manski-Nankervis et al. 2022	General population split by education status, gender, age, and whether they speak English at home.	Patient experience	Primary Care
Mostafa and Hegazy 2020	Not specified - assume general population	Patient experience	Dermatology
Ball et al. 2022	Not specified - assume general population	Clinician-Patient relationship Patient experience	Gynecology

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
		Health inequalities	
Sharma et al. 2022	High/low video adopters	Clinician-Patient relationship	Ambulatory care

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
Grens et al. 2022	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Sexual Medicine
Aliberti et al. 2022	Elderly patients	Clinician-Patient relationship Health Inequalities	Primary Care
Rego et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Outpatient care
Swaminathan et al. 2022	Not specified - assume general population	Patient experience	Otorhinolaryngology
Heyck et al. 2022	Patients with particular condition, split by age, ethnicity and fluency in English	Clinician-Patient relationship Patient experience Health inequalities	Nephrology
Olszewski et al. 2021	Not specified - assume general population	Patient experience	Neurology
Kling et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Neurology
Taylor et al. 2022	Urban/Suburban	Clinician-Patient relationship Patient experience Health inequalities	Primary care
Tornero-Molina et al. 2020	Patients with a particular condition, split by gender, age, and education level	Clinician-Patient relationship Patient Experience	Rheumatology
Hays and Skootsky 2022	General population split by gender, age, ethnicity	Patient experience	Ambulatory care, including primary care and specialist physician visits
Thiele et al. 2022	Not specified - assume general population	Patient experience	Rheumatology
Volandes et al. 2022	Older adults, racial and ethnic minority individuals split by age and gender	Clinician-patient relationship	Ambulatory care
Nguyen et al. 2022	General population split by socioeconomic level, race/ethnicity, language and smartphone use	Health Inequalities Patient experience	Safety-net health systems
Al-Iede et al. 2021	Children with a particular condition	Health Inequalities Patient experience	Emergency Department
Dempsey et al. 2022	Children and their families	Health Inequalities Patient experience	Paediatric Gastroenterology
Parsons et al. 2022	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Neuropsychology
Fu et al. 2022	Vulnerable migrants/asylum seekers, younger adults across various socio-economic conditions.	Health Inequalities	Primary care
Sugarman et al. 2021	General patients and those with (more severe) psychatric conditions	Clinician-Patient relationship Health Inequalities	Substance misuse
Johnson et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Primary Care
Kalwani et al. 2021	Patients split by age, gender and baseline clinical conditions	Health Inequalities Patient experience	Preventive cardiology
Vongsachang et al. 2021	Children	Clinician-Patient relationship Health Inequalities	Paediatric ophthalmology

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
et al. 2021	Not specified - assume general population	Patient experience	Emergency Department
Tai-Seale et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Ambulatory care
Maher et al. 2021	Not specified - assume general population	Patient Experience	Outpatient care
Kamimura et al. 2021	Insurance status and spoken language	Health Inequalities Patient experience	Primary care
Altulaihi et al. 2021	Patients split by gender	Clinician-Patient relationship	Primary Care
Utley et al. 2021	Not specified - assume general population	Health inequalities	Family medicine

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
Alhajri et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Outpatient care
LeBrun et al. 2021	Not specified - assume general population	Patient experience	Outpatient Arthroplasty
Florea et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Primary Care
Frank et al. 2021	Low-incom adults and children with a particular condition	Health Inequalities	Mental Health
Orrange et al. 2021	Urban adults, split by income and age	Clinician-Patient relationship Patient Experience	Internal Medicine
Kletecka-Pulker et al. 2021	Not specified - assume general population	Patient experience	Outpatient care
Alharbi et al. 2021	Patients split by gender and level of education	Health Inequalities Patient experience	Family medicine, obstetrics and gynaecology
Jhaveri et al. 2022	Urban/Suburban/Rural	Clinician-Patient relationship	Rheumatology
Rosler 2020	Not specified - assume general population	Clinician-Patient relationship Health Inequalities Patient Experience	Paediatrics
Dhahri et al. 2020	Patients split by age	Clinician-Patient relationship Patient Experience	Outpatient care
Kumar et al. 2020	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Orthopedics
Troncone et al. 2022	Children	Clinician-Patient relationship Health Inequalities Patient Experience	Primary Care
Assenza et al. 2020	Patients split by gender	Patient experience	Outpatient care
White et al. 2022	Not specified - assume general population	Clinician-Patient relationship	Primary Care
Villalobos and Calvanese 2021	Not specified - assume general population	Clinician-Patient relationship	Outpatient care
Massaroni et al. 2021	Patients with a particular condition living in a particular region split by age	Clinician-Patient relationship Patient experience Health inequalities	Outpatient care
Curtis et al. 2021	Patients split by age, gender, ethnicity and socioeconomic group	Patient experience	Primary Care
Mathew et al. 2021	Not specified - assume general population	Patient experience	Primary Care
Skelly et al. 2021	Patients distant from hospital, with mobility or chronic illness, with limited access to transport or those who require chaperoning	Clinician-Patient relationship Patient experience Health inequalities	Primary care and outpatient
Riedel et al. 2021	Insured/uninsured patients	Clinician-Patient	Substance misuse

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
		relationship Health Inequalities	
Moore et al. 2022	Patients split by age, gender, care giving status, education, socioeconomic status, ethnicity	Health Inequalities Patient experience	Internal Medicine
Ennis et al. 2021	Women and maternity status	Clinician-patient relationship	Sexual Medicine
Conway et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Neuro-ophthalmology
Verma and Kerrison 2022	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Primary Care
Kludacz-Alessandri et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Primary Care
Adams et al. 2021	Patients split by gender, age, educational qualification, health literacy and internet access	Health Inequalities Patient experience	Rheumatology

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
Franzosa et al. 2021	Older adults (with/without sensory and cognitive difficulties), access to technology, reliance on caregivers/aides	Clinician-Patient relationship	Primary Care
Teng et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Outpatient care
Reicher et al. 2021	Adults, using social media networks split by gender and with/without chronic conditions	Health Inequalities Patient experience	Primary care
Chiang et al. 2021	Not specified - assume general population	Patient experience	Primary care and outpatient
Javanparast et al. 2021	Population groups with low digital literacy	Clinician-Patient relationship Patient experience Health inequalities	Primary care
Gupta et al. 2021	Not specified - assume general population	Patient experience	ENT
Day et al. 2021	Not specified - assume general population	Patient experience	Primary Care
Staffieri et al. 2021	Children	Health Inequalities Patient experience	Paediatric Ophthalmology
Chesnel et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Neurology
Kurotschka et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Primary Care
Malliaras et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Physiotherapy
Krasovsky et al. 2021	Children	Clinician-Patient relationship Health Inequalities	Paediatric Telerehabilitation
Mustafa et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Immunology
Franzosa et al. 2021	Elderly patients	Clinician-Patient relationship	Geriatric Home-based primary care practices
Saiyed et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Ambulatory care
Kirby et al. 2021	Patients split by their ability to adopt new technology and communication effectiveness	Clinician-Patient relationship Patient Experience	Sports Medicine
Khan et al. 2021	Patients split by gender, education and age.	Patient experience	Orthopedics, ophthalmology, general medicine

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
Reynolds-Wright et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Sexual Medicine
Murren-Boezem et al. 2021	Children	Clinician-Patient relationship Health Inequalities Patient Experience	Paediatrics
Barkai et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient experience	Outpatient care
Miller et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Physical therapy
Mills et al. 2021	Patients split by ethnicity, gender, income level.	Health inequalities	Primary care
Byrne and Watkinson 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Orthodontics
Itamura et al. 2021	Not specified - assume general population	Patient experience	Otolaryngology
Kato-Lin et al. 2021	Adults, split by gender, level of internet use and education level	Health Inequalities Patient experience	Acute care
Holtz 2021	Patients registered with a primary care physician	Patient experience	Primary Care
Imlach et al. 2020	Patients with social media access	Patient experience	Primary Care
Schweiberger et al. 2020	Children	Health Inequalities Patient experience	Paediatric primary care

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
Berg et al. 2020	Adults	Clinician-Patient relationship Patient experience Health inequalities	Sexual Medicine
Dietzen et al. 2020	Not specified - assume general population	Clinician-Patient relationship Health Inequalities	Paediatrics
Isautier et al. 2020	Children	Health Inequalities Patient experience	Paediatric Physiatry
Esper et al. 2020	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Outpatient care
Shachak et al. 2020	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Outpatient care
Dooley et al. 2020	Not specified - assume general population	Clinician-Patient relationship	Sexual Medicine
Olayiwola et al. 2020	Not specified - assume general population	Clinician-Patient relationship	Family medicine
Patel et al. 2020	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Outpatient care
Tenforde et al. 2020	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Outpatient Sports and Musculoskeletal Medicine Physicians
Verduzco-Gutierrez et al. 2020	Not specified - assume general population	Clinician-Patient relationship	Outpatient telerehabilitation or prerehabilitation
Webber et al. 2021	Urban population split by socioeconomic status	Health inequalities	Primary Care
Scherer et al. 2021	Patients split by age and gender	Clinician-Patient relationship	Orthopaedic and trauma care

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
		Patient experience Health inequalities	
Parker and Chia 2021	Patients split by age and gender	Clinician-Patient relationship Patient experience Health inequalities	Dentistry
Fluhr et al. 2021	Patients split by age and gender, as well as distance between clinic and home	Clinician-Patient relationship Patient Experience	Dermatology
Lewis et al. 2021	Patients with mental health conditions	Patient experience	Outpatient care
Tozour et al. 2021	Women and maternity status	Patient experience	Obstetrics
Menhadji et al. 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Dentistry
Kumar et al. 2021	Patients split by age, gender and level of education.	Health Inequalities Patient experience	Haematology
Grosman-Dziewiszek et al. 2021	Not specified - assume general population	Patient experience	Community Pharmacy
Dopelt et al. 2021	Patients split by level of internet use, ehealth literacy, age and education level	Health Inequalities Patient experience	Primary care
Wilson et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Primary Care
Gold et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Primary Care
Johnsen et al. 2021	Not specified - assume general population	Clinician-Patient relationship	Primary Care
Esade Creapolis 2020	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Primary and community Care
Lopez et al. 2021	Legal/Illegal immigrants, socioeconomic deprivation, migrant population groups	Health Inequalities	Primary Care
Murillo Lesmes 2021	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Endocrinology and nutrition

Author year	Population	Concept	Context (Primary/Outpatient care speciality)
Sutton Cherem 2021	Urban/Rural	Clinician-Patient relationship Health Inequalities	Primary Care
Comité de ética asistencial de Atención Primaria de Bizkaia	Not specified - assume general population	Clinician-Patient relationship Patient Experience	Primary Care, Dermatology, pediatrics, digestive, gynecology, psychological assistance (specialities given as example in the commentary)
Organizacion Medica Colegial de España 2021	Urban/Rural	Clinician-Patient relationship	Primary Care
Kludacz-Alessandri et al. 2021	Not specified - assume general population	Patient experience	Primary Care

Summary document characteristics

	Document characteristics	Number of documents
Academic/other documents		
	General Google Search	14
	Academic study	2
	Other document	12
	Academic Database	120
	Academic study	95
	Other document	25
Researcher location		
	North America	58
	Europe	39
	Australia and New Zealand	14
	Asia	13
	South America	3
	Africa	2
	Not reported	5
Telehealth Medium		
	Not reported	77
	Video	30
	Telephone and video	14
	Telephone	13
Survey/Questionnaire Sample size		
	9-229	30
	230-249	14
	450-669	7
	670-889	3
	890-999	2
	1,000-2,225	8
	2,226+	3
	Not specified	14
Methodology		
	Survey	52
	Questionnaire	29
	Commentary	19
	Interview	7
	Rapid review	5
	Questionnaire+interview	4
	Survey+interview	4
	Operational data analysis	3
	Guidance	2
	Systematic Review	2

	Board Report	1
	Case study	2
	Conversation Analysis and Sociolinguistic Discourse Analysis	1
	Local government report/plan	1
	Randomised Controlled Trial	1
	Survey and clinical data analysis	1
Design		
	Cross-sectional	97
	Longitudinal	12
	Randomised trial	1
	Not reported	2
	Not applicable	22

Legend: The table outlines the breakdown of documents covering the various areas. For instance, 14 documents were found via Google Search, or 97 documents had a cross-sectional design.

Summary results against protocol's Population Context Concept

		Protocol PCC	**Number of texts**
Population			
	UK protected characteristics		
		Age[a]	39
		Sex	20
		Race (or ethnicity)	9
		Pregnancy and maternity	2
		Disability	2
	Other UK protected characteristics [b]		0
	Other characteristics		
		Location [c]	6
		Socioeconomic status [d]	28
		Digital [e]	10
		Health status [f]	12
		No split	66
Context			
		Outpatient specialty	56
		Primary care only	46
		Outpatient care	19
		Primary care and outpatient	6
		Emergency Department	3

		Primary care and other specialties	2
		Community Pharmacy	1
		Various	1
Concept			
	One Concept		
		Clinician-Patient relationship	28
		Health inequalities	11
		Patient experience	26
	Two concepts		
		Clinician-Patient relationship Health Inequalities	11
		Clinician-Patient relationship Patient Experience	29
		Health Inequalities Patient experience	16
	All three concepts		
		Clinician-Patient relationship Patient experience Health inequalities	13

Note: The total for population adds to more than 134 as a particular document can cover more than one category. [a] Children, adults, elderly population. [b] Gender reassignment, marriage/civil partnership, religion or belief and sexual orientation. [c] Urban/rural or care home residence or closeness to health centre. [d] Education, income, insured/uninsured status, migrant, ability to speak local language, access to transport, care giving status. [e] Ownership, use, literacy, ability to adopt new technology. [f] Particular condition, chronic condition, health literacy.

Legend: The table outlines the breakdown of documents covering the elements related to the population, concept and context. For example of the 134 documents, 39 had specific references to the age of the participants in the study.

Appendix III: Example searches

Please note this section has been taken verbatim from the protocol:

Valdes D, Alqazlan L, Procter R, Dale J. Global evidence on the rapid adoption of telemedicine in primary care during the first 2 years of the COVID-19 pandemic: a scoping review protocol. Systematic Reviews 2022 Jun 19;11(1):124. doi: 10.1186/s13643-022-01934-3

Search terms and examples

PubMed Search

(((primary care) AND (telemedicine adoption) AND (pandemic)) AND ((patient experience) OR (health inequalities) or (patient clinician relationship))) AND ((systematic review[Title]) OR (scoping review[Title]))

PROSPERO SEARCH

(telemedicine AND (primary care)) AND (((coronavirus or corona-virus) AND (wuhan or beijing or shanghai or Italy or South-Korea or korea or China or Chinese or 2019-nCoV or nCoV or COVID-19 or Covid19 or SARS-CoV* or SARSCov2 or ncov)) OR (pneumonia AND Wuhan) or "COVID-19" or "2019-nCoV" or "SARS-CoV" or SARSCOV2 or 2019-nCov or "2019 coronavirus" or "2019 corona virus" or covid19 or ncov OR "novel corona virus" or "new corona virus" or "nouveau corona virus" or "2019 corona virus" OR "novel coronavirus" or "new coronavirus" or "nouveau coronavirus" or "2019 coronavirus") AND (general_interest OR Health inequalities/health equity OR International development OR Public health including social determinants of health):HA NOT Animal:DB.

Simplified search terms for other languages

Top five internet languages

- **English:** telemedicine, “primary care”, “patient experience”, “health inequalities”, “patient-clinician trust”
- **Chinese** (simplified): □□□□, □□□□, □□□□,
- **Spanish:** Telemedicina, “atencion primaria”, “experiencia del paciente”, “inequidad en salud”, “confianza en el profesional de la salud”
- **Arabic**: " “,”الرعاية الصحية الأولية“ ,”التطبيب عن بعد“ عدم المساواة الصحية تجربة المريض, ”ثقة الطبيب المريض“
- **Portuguese (Brazil)** Telemedicina, “atenção primária a saúde”, “experiência do paciente”, “desigualdade na saúde”, “confiança entre paciente e medico”

First language spoken in the most populated countries in the world (if not in the above list)

- Hindi (India): □□□□□□□□□□□, □□□□□□□□□ □□□□□□□□, “□□□□ □□□□□”, “□□□□□□□□□ □□□□□□□”, “□□□□ □□ □□□□□□□□ □□ □□□ □□□□□□□”
- Indonesian: telemedicine, “kedokteran keluarga”, “pengalaman pasien”, “ketimpangan Kesehatan”, “kepercayaan antara pasien dan dokter”
- Urdu (Pakistan):” بنیادی“, “ ”ٹیلی میڈیسن“ درمیان اعتماد کے مریض اور معالج ”دیکھ بھال”, مریض کا تجربہ”, “صحت کی عدم مساوات”,

Google Search Pakistan (.pk)
6 March 2021
Terms: **covid-19 "ٹیلی میڈیسن" "بنیادی دیکھ بھال" did not provide any search results when restricting to Pakistan (as not possible to have language search in Urdu)**
When changing to: covid-19 **ٹیلی میڈیسن, بنیادی دیکھ بھال** filetype:pdf and expanding to 'any region' the documentation was mostly US-based.
Third approach:
covid-19 "Telemedicine" "Primary Care" site:.pk filetype:pdf
Documents in English but published in Pakistan.

Number	Link	Title	Extracts
1	https://storage.covid.gov.pk/new_guidelines/01June2020_20200530_Guidelines_for_working_of_OPDs_for_Routine_Patients.pdf	Guidelines for working of Outdoor Patient Departments/ Primary Health Care Centre in wake of COVID-19 outbreak	The activation of services for non-COVID19 patients at primary care would potentially result in increased patient turn over at these facilities but nearer to the doorsteps of population, resulting in lesser mobility of the public and reduction of influx to major hospitals. This guidance reflects the need to 1. Ensure provision of services for illnesses other than COVID19 in OPDs of large hospitals and linking the primary care doctors with the specialists at hospitals through telemedicine where feasible (preferably all facilities to be linked through internet) 2. Identify persons with presumptive COVID-19 disease and implement a triage procedure to assign appropriate levels of care through implementation of 'Fever clinics' 3. Reduce the burden on emergency departments and major hospital OPDs so that they can deal with COVID-19 cases and serious emergencies 4. Put in place precautionary measures for the doctors/HCPs, all of whom should go through relevant trainings programs ("We Care" and others) Outpatient department All large hospitals offering OPD service to non COVID19 patients and PHCC should develop local SOPs, in consultation with stakeholders, appropriate to their local environment but keeping in mind the general principals stated in these guidelines. Essential functional components of any OPD service should include Screening area, Registration area, Waiting area, Consultation rooms and other services like Pharmacy/labs etc
2	http://www.na.gov.pk/uploads/1591967303_200.pdf	Pakistan Annual Plan 2020-21	Strengthen the official COVID-19 website as the official and trusted source of all information with latest COVID-19 related national statistics, information on testing centres and quarantine facilities, latest guidelines, advisories and other important decisions as well as information from the provinces and live reporting by cities into the dashboards for correct updates; with appropriate social media marketing and dissemination by mainstream media channels, including addressing latest misinformation and myths around the pandemic • Exploit the mediums of radio, television, telemedicine, free SMS help lines

			and WhatsApp groups to communicate vetted public health messages around COVID-19 and redirect public to official website for verified information • Develop national emergency risk communication and community engagement strategies • Use electronic, social and print media to communicate technically vetted public health messages • Train HRH in emergency health care/ambulatory care, health management and other specialties as identified in the provincial and national health strategic frameworks • Use digital technology & enhance broadband coverage for telemedicine
3	https://pshealthpunjab.gov.pk/Upload/Downloads/hm3hq3nx.pl020200515.pdf	GENERAL GUIDELINES FOR HOME ISOLATION OF COVID-19 PATIENTS	STEPS TO FOLLOW i. Patients and household members should be educated about personal hygiene, basic IPC measures and how to care as safely as possible to prevent the infection from spreading to household members and contacts. ii. All persons to be Home-Isolated should be provided written instructions regarding monitoring of symptoms and establishing contact with healthcare provider via telemedicine. A. PLACEMENT i. Place the person in a well-ventilated single room (i.e. open windows and an open door) preferably with attached bathroom. ii. Ensure that shared spaces (i.e. kitchen, bathroom, lounge etc) are well ventilated (keep windows open)
4	https://www.aimc.edu.pk/Publication/Vol%2018%20Issue%2004.pdf	COVID-19 OUTBREAK: ITS PSYCHOLOGICALAND BEHAVIORAL EFFECTS IN PAKISTAN	Abstract Background: COVID-19 was declared a pandemic in March 2020 by WHO. With the constant rise in the number of cases worldwide and the increasing number of deaths, COVID-19 is a threat to the psychological wellbeing of the people. Data is needed to form evidence-based strategies to cater to the psychological needs of the people Objectives: This study aims to assess the impact of the pandemic on the mental health of the people and to identify their major concerns regarding the current situations. So that our findings can be used to form future strategies to provide adequate psychological aid to the people of Pakistan. Methodology: From 10th April to 14th April we conducted an online survey to assess the initial psychological response of people of Pakistan to the pandemic. We used the snowball sampling strategy to collect the data. We collected information on demographic data, major concerns of the people, state of awareness about telemedicine facilities, and psychological responses to the spread of misinformation and practices like panic buying. The psychological well-being of people was assessed using the DASS-21 scale for anxiety, stress and depression. Results: Out of our 906 respondents, 40% of respondents reported moderate to extremely severe symptoms of depression, 36.2%% of respondents showed symptoms of moderate to extremely severe anxiety, and 19.9%% of respondents were moderate to extremely severely stressed. Women, young adults (age 18-24), people who had a history of

			contact with a confirmed or suspected case of COVID-19, and people who showed symptoms like cough, fever, and shortness of breath had comparatively higher DASS scores. The spread of misinformation and practices like panic buying also showed to harm the psychological health of people. 47.4% of respondents were unaware of any telemedicine facility. The majority of the respondents identified WhatsApp as the major source of misinformation 71.1% of respondents said that they would want professional advice on how to cope with the stress of the pandemic. Conclusion: During the initial stages of the pandemic in Pakistan, more than one-third of the respondents reported their psychological effect as moderate to extremely severe. Our findings suggest that women, people with contact history, adults from ages 18 to 24, and people who show symptoms like cough, fever, etc. are high-risk groups. Moreover, the spread of misinformation, and practices like panic buying are associated with poor psychological health. Our findings identify the major concerns of the general population of Pakistan and can be used to formulate future policies. Keywords: Pandemic, psychological impact, COVID-19, mental health, concerns, anxiety, depression, stress.

OVID (Medline all) - Search conducted on 13 January 2022

Search	Query (title, abstract, keyword heading)	Records retrieved
#1	telemedicine or telehealth or "digital health" or phone or telephone or video or virtual or remote or e-consults or e-consultation or tele-consult or phone consult or ehealth or tele-health or tele-medicine or e-health	371,957
#2 [206]	coronavirus* or coronovirus* or coronavirinae* or Coronavirus* or Coronovirus* or Wuhan* or Hubei* or Huanan or "2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or CoV or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or pandemic or outbreak or epidemic	398,362
#3	"general practice" or "general practitioner" or "general physician" or "general clinician" or "general doctor" or "general nurse" or "general nursing" or "general medicine" or	100,210

	"family practice" or "family practitioner" or "family physician" or "family clinician" or "family doctor" or "family nurse" or "family nursing" or "family medicine" or "Primary Care clinic" or "primary care practitioner" or "primary care physician" or "primary care clinician" or "primary care doctor" or "primary care nurse" or "primary care nursing" or "primary care medicine" or "Primary health care clinic" or "primary health care practitioner" or "primary health care physician" or "primary health care clinician" or "primary health care doctor" or "primary health care nurse" or "primary health care nursing" or "primary health care medicine" or "primary healthcare clinic" or "primary healthcare practitioner" or "primary healthcare physician" or "primary healthcare clinician" or "primary healthcare doctor" or "primary healthcare nurse" or "primary healthcare nursing" or "primary healthcare medicine" or GP, doctor, nurse, physician, clinician	
#4	#1 AND #2 AND 3	318
#5 [207]	"patient experience" or "patient satisfaction" or "patient opinion" or "PREM", or "patient survey" or "patient preference" or "client experience" or "client preference" or "service user preference" or "client experience survey" or	1,019,204

	"healthcare survey" or "healthcare evaluation" or "health surveys" or questionnaire or survey or "patient voice" or "service user voice" or "patient perspective" or "patient centered quality" or "patient perception" or "patient view"	
#6 [207]	"Health inequalities" or "health inequality" or "health inequity" or "health inequities" or "socioeconomic determinants" or "social determinants of health" or "social disparities" or "vulnerable population" or "disadvantaged populations" or "low income populations" or "ethnic minority" or "indigenous populations" or "underserved populations" or "health inequities" or "geographical inequalities" or "remote populations" or "deprived community" or "social deprivation" or "protected characteristics" or gender, age, "maternity status" or LGBTQ+ or veteran or transgender or "minoritised populations" or disabled or "learning disability" or "married" or "religious populations" or refugee or migrant	134,379
#7	"patient trust" or "trust in clinician" or "trust in physician" or "trust in nurse" or "trust in medical professionals" "trust in health practitioner" or "trust in medical profession" or "trust in medical decision making" or "physician-patient Relationship" or "patient-clinician relationship" or "patient	640,538

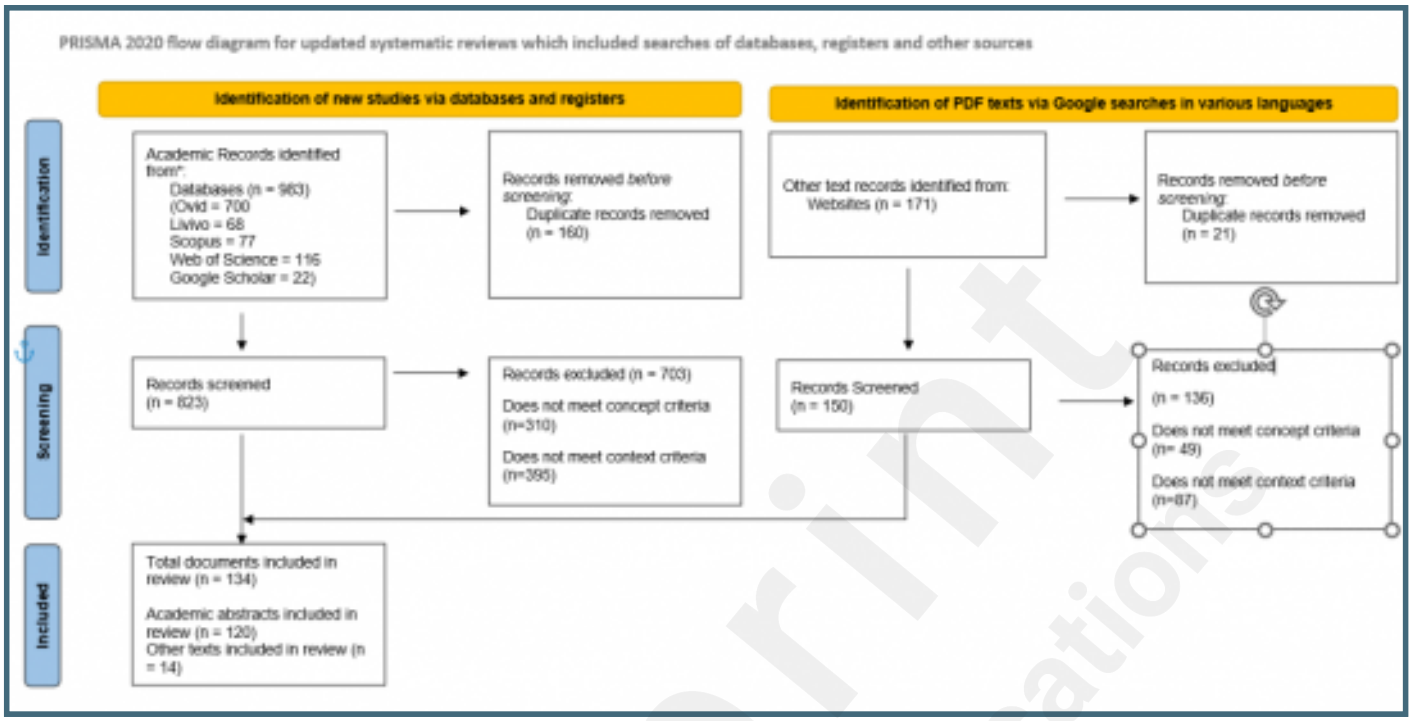
	clinician communication" or "patient clinician trust" or "patient clinician rapport" or "patient clinician relationship" or "physician patient relationship" or "patient rapport" or "rapport with patient" or "doctor patient relationship", "clinician patient relationship" or "nurse patient relationship" or "doctor patient rapport" or "patient clinician interaction" or "patient clinician encounter" or trust or reliance or confidence	
#8	#5 OR #6 OR #7	1,677,187
#9	#4 AND #8	128
Limited to 2020 onwards		116

Supplementary Files

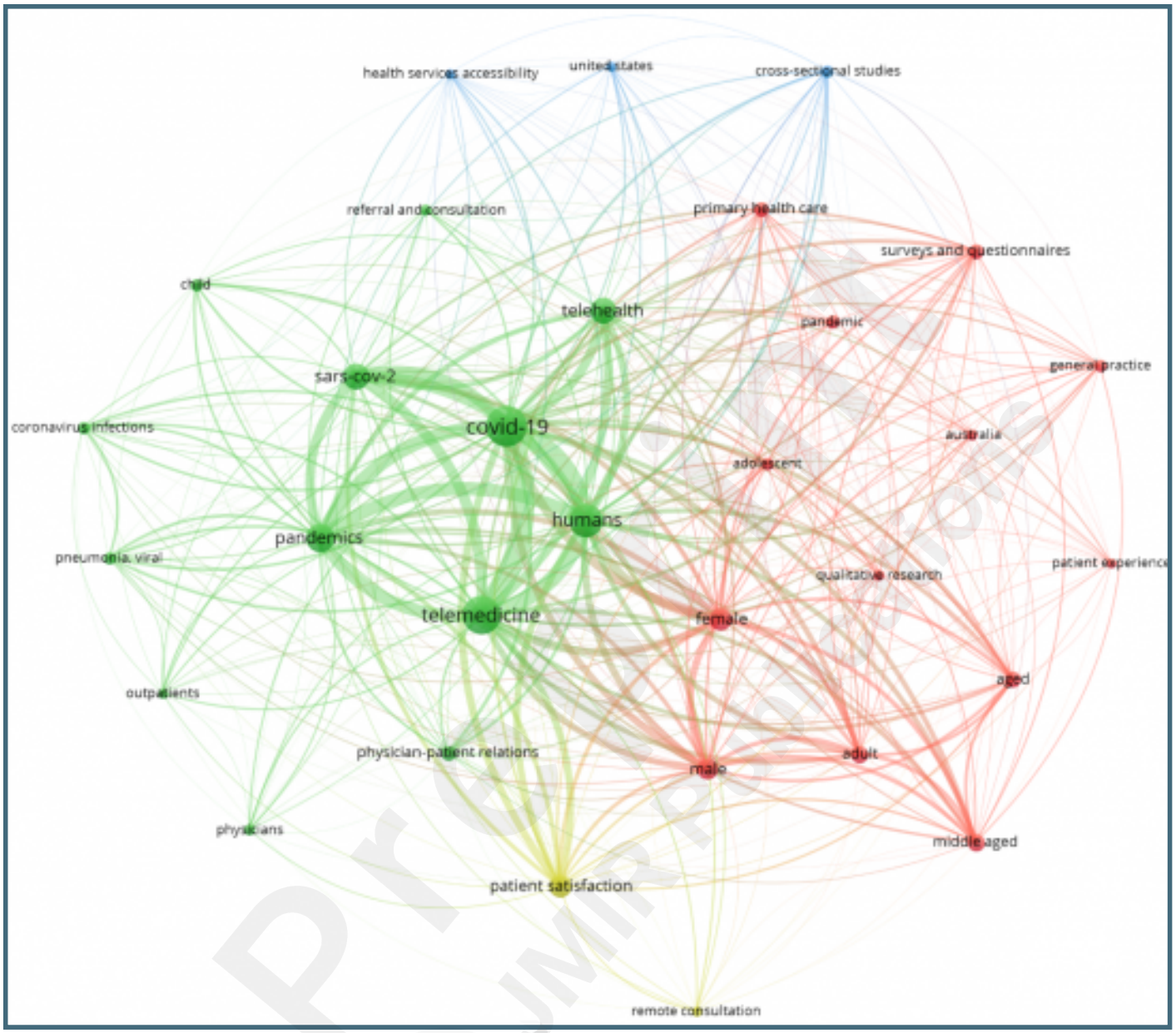
Untitled.
URL: http://asset.jmir.pub/assets/5297b511d50d90f37788a6a81b158989.docx

Figures

Prisma flow chart outlining the process of identification, screening and final inclusion across various types of data sources.



Bibliographic keyword analysis.



Heatmap against each of the NASSS domains.

NASSS Domain		NASSS Mapping
Domain 1 Condition	1. Condition/Illness/ Multimorbidity.	50
	1a. Sociocultural factors	76
Domain 2 Technology	2. Technology description	74
	2a. Technology performance and and dependability	63
	2b. Technology knowledge/data created by it (including usability/acceptability)	78
	2c. Technology - knowledge to use it.	58
	2d. Technology requires major changes to service/patient tasks and routines	69
Domain 3 value Proposition	3a. Supply-side value (for clinicians/provider)	93
	3b. Demand-side valude for patients	90
Domain 4 Adopters	4a. Staff (if reported)	71
	4b. Patients (if reported)	84
Domain 5 Organisation	5. Organisations/Capacity to innovate in general/ Readiness-Pace of adoption	66
Domain 6 Wider system	6. Wider system/Political-Policy context/Regularory-legal issues/Professional Bodies/Sociocultural context/Interorganisational networking	104
Domain 7	7. Embedding and adapting over time/Scope for adaptation over time/Organisational resilience.	109

Key	
Lowest in rank	49
20-40%	61
40%-60%	73
60%-80%	85
80+ and above	97
Highest in rank	109

Multimedia Appendixes

Data collection template.
URL: http://asset.jmir.pub/assets/de39973033a5696f353b2e1404e87180.xlsx

Detailed search strategies for each database.
URL: http://asset.jmir.pub/assets/7889d6e43b88f2951ffd9bc640402459.docx

Abstracts-extracts used in the study.
URL: http://asset.jmir.pub/assets/68be9b0692194bc39c91b07e01368a53.xlsx

CONSORT (or other) checklists

PRISMA Checklist.
URL: http://asset.jmir.pub/assets/c3de16c421030e168e0a15bbf0666872.pdf