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# BMJ Open

## Protocol for a scoping review of the use of information and communication technology platforms for the delivery and utilisation of transgender healthcare

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Manuscripts

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3 **Protocol for a scoping review of the use of information and communication technology**  
4 **platforms for the delivery and utilisation of transgender healthcare.**  
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# Protocol for a scoping review of the use of information and communication technology platforms for the delivery and utilisation of transgender healthcare

## Abstract:

### Introduction

In recent years, there has been strong interest in making digital health and social tools more accessible, particularly among vulnerable and stigmatised groups such as transgender people. While transgender people experience unique physical, mental, and sexual health needs, not much is currently known about the extent to which they utilise information and communication technologies (ICT) (i.e., short messaging service (SMS) and video-conferencing) while accessing health services. In this paper, we discuss our protocol for a scoping review of the literature about the delivery and utilisation of digitally mediated health services for transgender populations.

### Methods and analysis

This scoping review of the provision and experience of telemedicine among transgender people will follow the methodological framework developed by Arksey and O'Malley. The search will be conducted using three online databases, namely PubMed, CINAHL and Scopus, with additional literature explored using Google Scholar to identify grey literature. Relevant English-language studies will be shortlisted after completing a title and abstract review based on defined inclusion criteria. Following that, a final list of included studies will be compiled after a full-text review of the shortlisted articles has been completed. To enable the screening process, a team of researchers will be assigned refereed publications explicitly referring to the provision and experience of transgender healthcare through telemedicine that have been considered for inclusion. Screening performed independently will then collaboratively be reviewed to maintain consistency.

### Ethics and dissemination

The research is exempt from ethics approval since our analysis is based on extant research into the use of digital technologies in providing healthcare to transgender people. The results of these studies will be disseminated through peer-reviewed academic publications and presentations. Our analysis will guide the design of further research and practice relating to the use of digital communication technologies to deliver healthcare services to transgender people.

### **Strengths and limitations:**

- This is among the first scoping reviews of the digital communication tools and methods used for delivering healthcare services to transgender populations.
- This scoping review will identify methods that have been effective in improving healthcare uptake among transgender populations.
- This scoping review will inform further research on health promotion regarding the ways in which providing healthcare to transgender populations can be improved.
- This scoping review may be limited to literatures from resource-privileged and English-speaking countries because not all contexts have the resources and infrastructure to support research on, and the delivery of, telemedicine for transgender communities.

## Introduction

Transgender is ‘an umbrella term for persons whose gender identity or expression (masculine, feminine, other) is different from their sex (male, female) at birth’.[1] This definition includes individuals who undergo gender affirmation surgery and/or receive gender-related medical interventions like hormone therapy, and who identify as having no gender, more than one gender or alternative genders.[2] It is important to note that the ways and terms by which transgender people identify themselves are rooted in specific sociocultural contexts.[3, 4]

Despite the increasing social acceptance of sexual and gender diversity in various parts of the world, transgender people often experience social exclusion due to the stigma associated with transgressing social norms of gender and sexuality.[5-8] This stigmatization generally refers to a social process embedded in various social structures (i.e., family, religion, gender, and law) through which social actors label and ostracise certain population segments, thereby impeding transgender persons’ access to power and resources.[7] Researchers have for years been revealing that stigma associated with being transgender contributes to social disadvantage in many areas, including family, education, and the formal job market.[9-11]

The studies reveal that negative treatment of transgender people in society further results in adverse health outcomes. For instance, transgender people who are rejected by their families are more likely to experience mental illness including depression, anxiety, and suicidal ideation.[9, 12, 13] A lack of family support, as well as joblessness, means that transgender people may engage in survival sex, placing them at greater risk of HIV and other sexually transmitted infections (STIs),[14-16] with the Joint United Nations Programme on HIV/AIDS (UNAIDS) finding that nearly 19% of the transgender women worldwide live with HIV.[17] Additionally, transgender people’s likelihood of substance misuse often increases due to a lack of social support, lack of adequate financial resources, health issues, and peer pressure.[18-20]

Despite having unique health needs, transgender people often experience barriers to accessing adequate psychological, medical, and surgical treatments.[21] Transgender people may choose to seek certain psychological and/or medical treatments as part of their gender affirmation.[22] For example, some individuals may choose to transition socially and not medically.[23] Those choosing to transition medically can select from various interventions such as puberty blockers, hormone therapy, and surgeries.[24] Major factors that impede access to adequate healthcare among transgender people are discrimination in healthcare settings, a shortage of gender care specialists, a lack of adequate health insurance, and poverty.[21, 25, 26]

Researchers suggest that improving transgender people’s access to healthcare can improve their health outcomes.[27] One of the more recent methods that health promotion experts have adopted to improve transgender people’s accessibility to healthcare is the use of digital platforms to deliver healthcare.[28] Information and communication technologies (ICT) including computers, mobile phones, and the Internet can potentially be useful in addressing some of the challenges faced by developing and developed countries in providing accessible, cost-effective, high-quality health care services. Telemedicine draws on these technologies to overcome geographical barriers and increase access to health care services, notably among disadvantaged and stigmatised populations.[29]

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3 In recent years, there has been strong interest in the use of telemedicine to overcome social and  
4 spatial barriers to delivering adequate healthcare to transgender populations, largely in resource-  
5 privileged countries.[28] Telemedicine services that include the use of videoconferencing have  
6 been a useful tool for providing postoperative care to individuals who undergo gender  
7 affirmative surgeries,[30] particularly in situations where access is impeded, such as during the  
8 COVID-19 pandemic.[31] Additionally, telemedicine has helped to overcome the stigma barrier  
9 when it comes to HIV/STI screening/care among transgender populations.[32, 33]

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12 However, while some surveys have shown an increased acceptance of healthcare delivery  
13 through telemedicine among transgender populations, an analysis of its outreach, delivery  
14 methods, effectiveness, and challenges is lacking.[34, 35] A recent systematic review has  
15 suggested digital health interventions are important for young sexual minority people (aged 12-  
16 25).[36] Nevertheless, how the complexity and compatibility of delivering health care services to  
17 transgender people across the lifespan through ICT remains underexplored. This makes a review  
18 of the current use of telemedicine in transgender care interesting and timely.

## 21 Objectives

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23 In our scoping review, we aim to synthesise the existing evidence for the use of telemedicine in  
24 healthcare delivery among transgender populations. Through our analysis, we endeavour to  
25 identify, within the context of transgender health, the effective methods, potential gaps, and areas  
26 of improvement needed in telemedicine methods. We hope this review will help researchers,  
27 practitioners, policymakers, and other stakeholders who are involved in transgender healthcare to  
28 advance ICT-related service delivery, thus contributing to a more equitable, accessible, and  
29 effective provision of health services for such marginalised groups in the digital era.

## 32 Methods and analysis

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34 The development of this protocol was guided by the frameworks developed by Arksey &  
35 O'Malley,[37] and the PRISMA-ScR checklist.[38] As we are exploring an area by looking at  
36 emerging evidence and are not testing a hypothesis (for which a systematic review, which  
37 requires a stronger evidence base, would be more suitable), we decided to adopt a scoping  
38 review approach that considers relevant literature from diverse study modalities. Such an  
39 approach allows us to achieve a broader and clearer understanding of the various concepts,  
40 definitions, intervention types and knowledge gaps relating to the use of digital technologies in  
41 the provision and receipt of transgender health services. We hope that our efforts will help  
42 summarise and amplify knowledge on the types of work done under this topic, thereby informing  
43 hypothesis generation, empirical research, policymaking, clinical practice, and health promotion  
44 work.

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48 English-language literature that describes services and interventions that directly target  
49 transgender people worldwide will be included in the scoping review. Literature unrelated to the  
50 development or evaluation of digitally-mediated health care services (such as studies using ICT  
51 only as a means of participant recruitment and data collection), and those that describe services  
52 and interventions that do not directly target transgender people (e.g., articles discussing skills  
53 development for health care workers) will be excluded. The search will be conducted by using  
54 three major online databases, namely PubMed, CINAHL and Scopus, with additional literature  
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3 explored using Google Scholar. Relevant studies will be shortlisted after the completion of a title  
4 and abstract review based on defined inclusion criteria. Following that, a final list of included  
5 studies will be compiled after a full-text review of the shortlisted articles has been completed.  
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8 The rest of this review will be structured according to Arksey & O'Malley's scoping study  
9 framework,[37] which supports analytical and process rigour. The framework comprises five  
10 steps: (1) Identifying the research question, (2) identifying relevant studies (3): study selection,  
11 (4) charting the data, and (5): collating, summarising, and reporting the results.  
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### 13 Step 1: Identifying the research questions

14 As we seek to understand how digital platforms have been used in transgender health and the  
15 factors that facilitate and obstruct delivering and receiving care through such platforms, our  
16 research question is: *What does the extant research say about the delivery and receipt of*  
17 *transgender health services through digital means?* Based on what we might find, this research  
18 question might be refined throughout the scoping review, or additional research questions might  
19 be added.  
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22 Our operational definition of 'delivery of telehealth service for transgender people', a  
23 modification of Scalvini et al.'s definition of telemedicine,[39] is as follows:  
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25 *The digitally-mediated delivery of health services and interventions by clinicians and*  
26 *other health professionals to identify, mitigate and deter illness and overall lack of*  
27 *wellbeing, with the aim of improving the health of transgender individuals by increasing*  
28 *access to timely and appropriate healthcare,*  
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30 In our review, we will use the Centers for Disease Control and Prevention's definition of  
31 'transgender',[1] as 'an umbrella term for persons whose gender identity or expression  
32 (masculine, feminine, other) is different from their sex (male, female) at birth'.[1]  
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### 34 Step 2: Identify relevant studies

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37 In line with the purpose of scoping studies to be as comprehensive and broad as practicable, our  
38 comprehensive search strategy, developed through consensus among team members, begins with  
39 a literature scan of peer-reviewed publications, research methods and disciplines. The literature  
40 must be related to transgender and gender diverse people, and include any form of digital  
41 technology used, such as video and telephone consultations, SMS reminders, social media, and  
42 mobile applications. Due to time and cost considerations, we will not include material other than  
43 English even though relevant materials might be published in other languages. A first round of  
44 literature search or works published until July 2021 will be conducted. Because of the recency of  
45 digital-mediated options for transgender health, we will perform another round of search after the  
46 first draft of the review has been completed to include more recently-published literature.  
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51 The search queries were first developed for PubMed using medical subject headings (MeSH),  
52 and then extended to two scientific databases: CINAHL and Scopus. An additional search will be  
53 conducted using Google Scholar. We will first run an individual search using a broad list of  
54 terms across three components developed based on MeSH/CINAHL subject headings:  
55 telemedicine (e.g., m-health, e-health, digital health, telehealth), transgender persons (e.g.,  
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3 transgender, gender diverse, transman, transfeminine, gender non-binary), and delivery of health  
4 care (e.g., health service delivery, health promotion, consultation, and access to care). We will  
5 then combine these search terms to narrow our search to literature containing these three  
6 components and compare the results from the consolidation of terms to each of the initial three  
7 lists, to determine if the consolidated list captures relevant articles. We will then re-calibrate the  
8 search protocol based on the initial search results. A list of terms is provided in the appendix.  
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### 11 12 Stage 3: Study selection

13 Once it has been determined that the consolidated list captures suitable literature, a selection of  
14 articles will be presented to all team members for feedback as to whether they should be included  
15 in the review, to ensure consistency and to develop the screening frame further.  
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18 The initial inclusion criteria will be international literature on how digital technologies have been  
19 used in transgender health. A range of published and grey literature, including peer-reviewed  
20 publications commentaries, book chapters, reports, conference proceedings and theses will be  
21 considered. Articles published up to July 2021 will be included, with the details of potentially  
22 relevant literature published after this date included in an appendix. At every stage, eligibility  
23 criteria will be discussed and reached through consensus among all members of the team.  
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26 AC, CT, HW, IA will then independently screen abstracts and shortlist pieces of literature that  
27 are directly relevant to the research question for inclusion into the scoping review. An Excel  
28 spreadsheet will be used to finalise the list of articles for inclusion, with the spreadsheet noting  
29 publication information (type of publication, authors, publication year, title, journal, volume and  
30 issue, page numbers, URL, and keywords) and abstracts. As we found from an initial scan that  
31 some articles conflate populations (e.g., conflating the experiences of transgender people with  
32 that of men who have sex with men,), we will include a column that asks if each study focuses  
33 solely on gender diverse people or more broadly includes sexuality and gender diversity.  
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36 Members of the team will then be assigned to read the full articles to determine if they are  
37 relevant for inclusion. Articles whose relevance is unclear will be independently read in full by  
38 two other members of the team with the final determination being made through discussion and  
39 consensus. A flow chart of the study identification and selection process is shown in Figure 1.  
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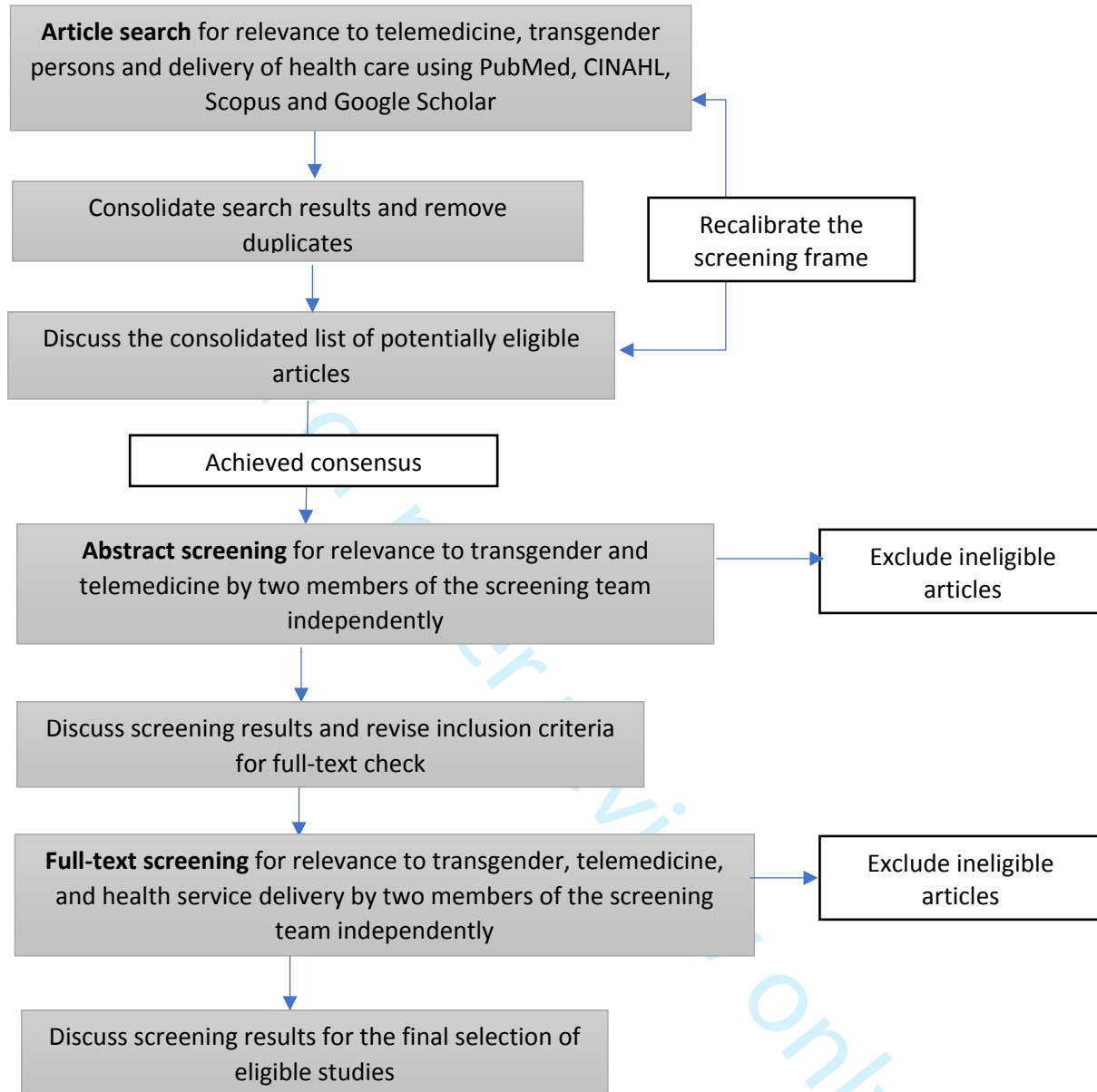


Figure 1 Flowchart of study identification and selection

#### Step 4: Charting the data

Following step 3, key points of information will be extracted from the reviewed material and then sorted. All members of the team will be tasked with reading a set of 5 articles and analysing them according to an analytical frame on an Excel spreadsheet that includes study information and outcomes (e.g., year, location, study populations, methodology, digital tools/interventions, conclusions, and important results). As data extraction and conceptual refinement is an iterative process, it is expected that categories would evolve during the process and over several discussions. After all doubts and inconsistencies are resolved through discussion and consensus,

each member of the analysis team will be assigned to assess different sets of publications from the final list.

### Stage 5: Collating, summarising, and reporting the results

The framework for collating, summarising, and reporting the results will be developed following the discussions at Stage 4. As we are examining literature from diverse sources and disciplines, we expect to encounter a range of concepts and methodologies. We will note areas of focus in the literature, document significant gaps, and note the range of interventions used, paying attention to the benefits and disadvantages of various interventions, and any geographical differences in the use of such interventions. Because not much is currently known about this topic, it may be difficult to make comparisons across intervention types or geographical regions, but we will endeavour to do so if appropriate.

### **Ethics and dissemination:**

The research is exempt from ethics approval since our analysis is based on extant research into the use of digital technologies in providing healthcare to transgender people. As the scoping review evaluates topic-relevant published and grey literature that is publicly available, research ethics approval is not required. To the best of our knowledge, our scoping review is the first study on the use of ICT to deliver health care services that are specifically for transgender people of different ages. From its broad evaluation of what is known and not known, it may guide the design of further studies and interventions at the intersection of transgender health and digital technology. Results from the review will be disseminated through an open-access peer-reviewed publication targeting a public health audience, and through academic and practitioner conferences in medicine, public health, and the social sciences.

### **Authors' contributions**

JC, MNN, and SKP contributed equally to the drafting and writing of this protocol. IYA, CT and HW also contributed equally through critically reviewing and revising of the proposal. MNN, SKP, and HW are researchers in the fields of sexuality, culture and health. They initiated the research idea and provided advice on the social and clinical aspects of transgender health. JC, CT and IYA are social health researchers and they participated in designing and refining the study protocol. HW developed the keyword search strategy and coordinated the trial literature search. He also performed a trial search on PubMed and CINAHL. IYA and SKP were responsible for the trial search on SCOPUS and Google Scholar retrospectively. CT, HW, IYA and JC performed a trial abstract scanning.

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## Patient and Public Involvement

No patient involved.

## Competing interests statement

The authors have no conflicts of interest to declare.

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# BMJ Open

## Protocol for a scoping review of the use of information and communication technology platforms for the delivery and utilisation of transgender healthcare

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4 **platforms for the delivery and utilisation of transgender healthcare.**  
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## Protocol for a scoping review of the use of information and communication technology platforms for the delivery and utilisation of transgender healthcare

### Abstract:

#### Introduction

In recent years, there has been strong interest in making digital health and social tools more accessible, particularly among vulnerable and stigmatised groups such as transgender people. While transgender people experience unique physical, mental, and sexual health needs, not much is currently known about the extent to which they utilise information and communication technologies (ICT) such as short messaging service (SMS) and video-conferencing to access health services. In this paper, we discuss our protocol for a scoping review of the literature about the delivery and utilisation of digitally mediated health services for transgender populations.

#### Methods and analysis

This scoping review of the provision and experience of telemedicine among transgender people will follow the methodological framework developed by Arksey and O'Malley (2005). The search will be conducted using three online databases, namely PubMed, CINAHL and Scopus, with additional literature explored using Google Scholar to identify grey literature. Relevant English-language studies will be shortlisted after completing a title and abstract review based on defined inclusion criteria. Following that, a final list of included studies will be compiled after a full-text review of the shortlisted articles has been completed. To enable the screening process, a team of researchers will be assigned refereed publications explicitly referring to the provision and experience of transgender healthcare through telemedicine. Screening performed independently will then collaboratively be reviewed to maintain consistency.

#### Ethics and dissemination

The research is exempt from ethics approval since our analysis is based on extant research into the use of digital technologies in providing healthcare to transgender people. The results of this study will be disseminated through peer-reviewed academic publications and presentations. Our analysis will guide the design of further research and practice relating to the use of digital communication technologies to deliver healthcare services to transgender people.

#### **Strengths and limitations:**

- This is among the first scoping reviews of the digital communication tools and methods used in the delivery of healthcare services to transgender populations.
- This scoping review will identify methods that have been effective in improving healthcare uptake among transgender populations.
- This scoping review will inform further research on health promotion regarding how providing healthcare to transgender populations can be improved.
- This scoping review may be limited to literatures from resource-privileged and English-speaking countries because not all contexts have the resources and infrastructure to support research on, and the delivery of, telemedicine for transgender communities.

## Introduction

Transgender is ‘an umbrella term for persons whose gender identity, gender expression or behavior does not conform to that typically associated with the sex to which they were assigned at birth’.[1] While gender identity can be understood as a person’s internal sense of being a man, woman, or something else, gender expression refers to how a person indicates gender identity to others in society through overall behaviour, clothing, hairstyle, voice, and other body characteristics. [1]

Despite the increasing social acceptance of gender diversity in various parts of the world, transgender people often experience social exclusion due to the stigma associated with transgressing social norms of gender.[2-5] This stigmatization generally refers to a social process embedded in various social structures (i.e., family, religion, gender, and law) through which social actors label and ostracise certain population segments, thereby impeding transgender persons’ access to power and resources.[4] Researchers have for years been revealing that stigma associated with being transgender contributes to social disadvantage in many areas, including family, education, and the formal job market, that have consequences for health.[6-9]

The studies reveal that negative treatment of transgender people in society further results in adverse health outcomes. For instance, transgender people who are rejected by their families are more likely to experience mental illness including depression, anxiety, and suicidal ideation.[6,10,11] The minority stress theory posits that transgender people routinely experience stressful events including prejudice and discrimination – not usually encountered by their cisgender counterparts – that negatively affect their psychological wellbeing. [12] Various researchers have used minority stress theory and found a significant association between social stress and psychiatric problems among transgender people. [13 -15] Additionally, a lack of family support, as well as joblessness, means that transgender people may engage in survival sex, placing them at greater risk of HIV and other sexually transmitted infections (STIs),[16-19] with the Joint United Nations Programme on HIV/AIDS (UNAIDS) finding that nearly 19% of the transgender women worldwide live with HIV.[20] Also, transgender people’s likelihood of substance misuse often increases due to a lack of social support, lack of adequate financial resources, health issues, and peer pressure.[21-23]

In addition to the heightened risk of HIV/STIs, mental distress, and drug/alcohol use, transgender people often have unique health needs regarding gender affirmation. The fundamental aim of gender affirmation is to affirm a person’s sense of self. [24] Understanding gender affirmation is not always straightforward, as transgender people may choose various ways including social/legal/medical interventions to achieve it. [25] For youth, gender affirmation may encompass social and/or medical transitions (i.e., puberty blockers, gender-affirming hormone treatment, and sometimes surgery). [26] To address ethical dilemmas about transitioning before legal adulthood, families, schools, and medical/clinical institutes are involved in providing gender affirmation to transgender youth [26, 27]. In addition to social and medical transitions, transgender adults may also pursue legal transition by changing their name and gender identity markers in institutional records. [28] Experiences regarding gender affirmation care significantly vary specifically among those who have completed the transition process, those undergoing it, and those who intend to do it, and hence, it requires adequate healthcare resources. While gender

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3 affirmation care is completely missing in many resource-poor and conservative settings,  
4 transgender people may experience challenges in utilising it due to discrimination in healthcare  
5 settings, a shortage of endocrinologists, a lack of adequate health insurance, and financial  
6 constraints. [27, 29, 30]  
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9 Researchers suggest that improving transgender people's access to healthcare can improve their  
10 health outcomes.[31] Information and communication technologies (ICT) including computers,  
11 mobile phones, and the Internet can potentially be useful in addressing some of the challenges  
12 faced by developing and developed countries in providing accessible, cost-effective, and high-  
13 quality health care services. Telemedicine draws on these technologies to overcome geographical  
14 barriers and increase access to health care services, notably among disadvantaged and  
15 stigmatised populations.[32] Indeed, because the COVID-19 pandemic restricted physical  
16 interactions to reduce the spread of the virus, the use of ICT has been very useful in continuing  
17 to deliver healthcare.[33]  
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21 There has also been strong interest in the use of telemedicine to overcome social and spatial  
22 barriers to deliver adequate healthcare to transgender populations, largely in resource-privileged  
23 countries.[33] Telemedicine services that include the use of videoconferencing have been a  
24 useful tool for providing postoperative care to individuals who undergo gender affirmative  
25 surgeries,[34] particularly in situations where access is impeded, such as during the COVID-19  
26 pandemic.[35] Additionally, telemedicine has helped to overcome the stigma barrier when it  
27 comes to HIV/STI screening/care among transgender populations.[36, 37]  
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30 However, while some surveys have shown an increased acceptance of healthcare delivery  
31 through telemedicine among transgender populations, an analysis of its outreach, delivery  
32 methods, effectiveness, and challenges is lacking.[38, 39] A recent systematic review has  
33 suggested digital health interventions are important for young sexual minority people (aged 12-  
34 25).[40] Nevertheless, the complexity and compatibility of delivering health care services to  
35 transgender people across the lifespan through ICT remain underexplored. This makes a review  
36 of the current use of telemedicine in transgender care interesting and timely.  
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### 38 **Objectives**

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40 In our scoping review, we aim to synthesise the existing evidence for the use of telemedicine in  
41 healthcare delivery among transgender populations. Through our analysis, we endeavour to  
42 identify, within the context of transgender health, the effective methods, potential gaps, and areas  
43 of improvement needed in telemedicine methods. We hope this review will help researchers,  
44 practitioners, policymakers, and other stakeholders who are involved in transgender healthcare to  
45 advance ICT-related service delivery, thus contributing to a more equitable, accessible, and  
46 effective provision of health services for such marginalised groups in the digital era.  
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### 49 **Methods and analysis**

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51 The development of this protocol was guided by the frameworks developed by Arksey &  
52 O'Malley,[41] and the PRISMA-ScR checklist.[42] As we are exploring an area by looking at  
53 emerging evidence and are not testing a hypothesis (for which a systematic review, which  
54 requires a stronger evidence base, would be more suitable), we decided to adopt a scoping  
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review approach that considers relevant literature from diverse study modalities. Such an approach allows us to achieve a broader and clearer understanding of the various concepts, definitions, intervention types and knowledge gaps relating to the use of digital technologies in the provision and receipt of transgender health services. We hope that our efforts will help summarise and amplify knowledge on the types of work done under this topic, thereby informing hypothesis generation, empirical research, policymaking, clinical practice, and health promotion work.

English-language literature that describes services and interventions that directly target transgender people worldwide will be included in the scoping review. Literature unrelated to the development or evaluation of digitally-mediated health care services (such as studies using ICT only as a means of participant recruitment and data collection), and those that describe services and interventions that do not directly target transgender people (e.g., articles discussing skills development for health care workers) will be excluded. The search will be conducted by using three major online databases, namely PubMed, CINAHL and Scopus, with additional literature explored using Google Scholar. Relevant studies will be shortlisted after the completion of a title and abstract review based on defined inclusion criteria. Following that, a final list of included studies will be compiled after a full-text review of the shortlisted articles has been completed.

The rest of this review will be structured according to Arksey & O'Malley's scoping study framework,[39] which supports analytical and process rigour. The framework comprises five steps: (1) Identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data, and (5) collating, summarising, and reporting the results.

### Step 1: Identifying the research questions

As we seek to understand how digital platforms have been used in transgender health and the factors that facilitate and obstruct delivering and receiving care through such platforms, our research question is: *What does the extant research say about the delivery and receipt of transgender health services through digital means?* Based on what we might find, this research question might be refined throughout the scoping review, or additional research questions might be added.

Our operational definition of 'delivery of telehealth service for transgender people', a modification of Scalvini et al.'s definition of telemedicine,[43] is as follows:

*The digitally-mediated delivery of health services and interventions by clinicians and other health professionals to identify, mitigate and deter illness and overall lack of wellbeing, with the aim of improving the health of transgender individuals by increasing access to timely and appropriate healthcare.*

In our review, we will use the American Psychological Association's definition of 'transgender',[1] as 'an umbrella term for persons whose gender identity, gender expression or behavior does not conform to that typically associated with the sex to which they were assigned at birth'.[1]

### Step 2: Identify relevant studies

In line with the purpose of scoping studies to be as comprehensive and broad as practicable, our



comprehensive search strategy, developed through consensus among team members with the support of an experienced librarian, begins with a literature scan of peer-reviewed publications, research methods and disciplines. The literature must be related to transgender and gender diverse people, and include any form of digital technology used, such as video and telephone consultations, SMS reminders, social media, and mobile applications. Due to time and cost considerations, we will not include material other than English even though relevant materials might be published in other languages. Works published until January 2022 will be included.

The search queries were first developed for PubMed using medical subject headings (MeSH), and then extended to two scientific databases: CINAHL and Scopus. An additional search will be conducted using Google Scholar. We will first run an individual search using a broad list of terms across three components developed based on MeSH/CINAHL subject headings: telemedicine (e.g., m-health, e-health, digital health, telehealth), transgender persons (e.g., transgender, gender diverse, transman, transfeminine, gender non-binary), and delivery of health care (e.g., health service delivery, health promotion, consultation, and access to care). We will then combine these search terms to narrow our search to literature containing these three components and compare the results from the consolidation of terms to each of the initial three lists, to determine if the consolidated list captures relevant articles. We will then re-calibrate the search protocol based on the initial search results. A list of search terms using PubMed is provided in Table 1.

Table 1 Search terms in PubMed

Search	Query
Telemedicine	"Telemedicine"[Mesh] OR "Mobile application*"[tw] OR "mobile app"[tw] OR "mobile apps"[tw] OR "mobile technolog*"[tw] OR "information communication technolog*"[tw] OR ICT OR "mobile health"[tw] OR mHealth OR Telehealth[tw] OR eHealth[tw] OR Telemedicine[tw] OR "smartphone"[tw] OR "digital health"[tw] OR ecare[tw] OR mcare[tw] OR telecare[tw] OR "Cellular phone*"[tw] OR "digital technolog*"[tw] OR "telecommunication*"[tw] OR "information technolog*"[tw]
Delivery of health care	"Delivery of Health Care"[Mesh] OR "Delivery of Health Care, Integrated"[Mesh] OR "Health Education"[Mesh] OR "health education"[tw] OR "health promotion"[tw] OR "delivery of healthcare"[tw] OR "consultation"[tw] OR "Health care"[tw] OR healthcare[tw] OR "health service"[tw] OR "health provision" OR "Delivery of Health services"[tw] OR "delivery of healthcare" OR "Health Services Accessibility"[Mesh] OR "Health Services Accessibility" OR "menstrual suppression" OR "speech therapy" OR "hair removal" OR "gender-affirming medical care"



Transgender persons	"Transgender Persons"[Mesh] OR "Health Services for Transgender Persons"[Mesh] OR "Sexual and Gender Minorities"[Mesh] OR "Gender diverse"[tw] OR "non-binary"[tw] OR "transgender"[tw] OR "sexual minorit*"[tw] OR "gender minorit*"[tw] OR "transman"[tw] OR "transwoman"[tw] OR Transmasculine [tw] OR Transfeminine[tw] OR genderqueer[tw] OR "gender fluid"[tw] OR "Gender non-conforming" OR "Cross sexual"[tw] OR "transsexual"[tw] OR "Gender Equity"[mesh] OR "gender equity"[tw] OR "Gender Affirmation Procedure*"[tw] OR "Gender identity"[mesh] OR "gender identity"[tw] OR "Gender Specific Care"[tw]
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### Stage 3: Study selection

Once it has been determined that the consolidated list captures suitable literature, a selection of articles will be presented to all team members for feedback as to whether they should be included in the review, to ensure consistency and to develop the screening frame further.

The initial inclusion criteria will be international literature on how digital technologies have been used in transgender health. With additional literature exploration using Google, Google Scholar and citation mining, a range of published and grey literature, including peer-reviewed publications commentaries, book chapters, reports, conference proceedings, and theses will be considered. Articles published up to January 2022 will be included, with the details of potentially relevant literature published after this date included in an appendix. At every stage, eligibility criteria will be discussed and reached through consensus among all members of the team.

AC, CT, HW and IA will then independently screen abstracts and shortlist pieces of literature that are directly relevant to the research question for inclusion into the scoping review. Each article will be reviewed by two members independently. An Excel spreadsheet will be used to finalise the list of articles for inclusion, with the spreadsheet noting publication information (type of publication, authors, publication year, title, journal, volume and issue, page numbers, URL, and keywords) and abstracts. As we found from an initial scan that some articles conflate populations (e.g., conflating the experiences of transgender people with that of men who have sex with men), we will include a column that asks if each study focuses solely on gender diverse people or more broadly includes sexuality and gender diversity. Nonetheless, these articles targeting transgender people with other LGBTIQ/sexual minority populations will be included in the review to identify specific recommendations on proving ICT interventions to transgender people.

Full-text screening will be conducted by two members independently to determine if they are relevant for inclusion. Articles whose relevance is unclear will be independently read in full by HW with the final determination being made through discussion and consensus. A flow chart of the study identification and selection process is shown in Figure 1.

### Step 4: Charting the data

Following step 3, key points of information will be extracted from the reviewed material and then sorted. All members of the team will be tasked with reading a set of 5 articles and analysing them according to an analytical frame on an Excel spreadsheet that includes study information and outcomes. The data extraction plan will consist of publication information (authors, article type, country and year of publication), types of ICT intervention used, target audience, total number of participants, total number of transgender participants, enablers and challenges described, specific recommendations to transgender people, limitations of study methodology, and key takeaways of the study. Nonetheless, as data extraction and conceptual refinement is an iterative process, it is expected that categories would evolve during the process and over several discussions. After all doubts and inconsistencies are resolved through discussion and consensus, each member of the analysis team will be assigned to assess different sets of publications from the final list.

### Stage 5: Collating, summarising, and reporting the results

The framework for collating, summarising, and reporting the results will be developed following the discussions at Stage 4. As we are examining literature from diverse sources and disciplines, we expect to encounter a range of concepts and methodologies. We will note areas of focus in the literature, document significant gaps, and note the range of interventions used, paying attention to the benefits and disadvantages of various interventions, and any geographical differences in the use of such interventions. As not much is currently known about this topic, it may be difficult to make comparisons across intervention types or geographical regions, but we will endeavour to do so if appropriate.

### **Ethics and dissemination:**

The research is exempt from ethics approval since our analysis is based on publicly-available research into the use of digital technologies in providing healthcare to transgender people. To the best of our knowledge, our scoping review is the first study on the use of ICT to deliver health care services that are specifically for transgender people of different ages. From its broad evaluation of what is known and not known, it may guide the design of further studies and interventions at the intersection of transgender health and digital technology. Results from the review will be disseminated through an open-access peer-reviewed publication targeting a public health audience, and through academic and practitioner conferences in medicine, public health, and the social sciences.

### **Authors' contributions**

JC, MNN, and SKP contributed equally to the drafting and writing of this protocol. IYA, CT and HW also contributed equally through critically reviewing and revising the proposal. MNN, SKP, and HW are researchers in the fields of sexuality, culture and health. They initiated the research idea and provided advice on the social and clinical aspects of transgender health. JC, CT and IYA are social health researchers and they participated in designing and refining the study protocol. HW developed the keyword search strategy and coordinated the trial literature search. He also performed a trial search on PubMed and CINAHL. IYA and SKP were responsible for

the trial search on Google Scholar and SCOPUS retrospectively. CT, HW, IYA and JC performed a trial abstract scanning.

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### Patient and Public Involvement

No patient involved.

### Competing interests statement

The authors have no conflicts of interest to declare.

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Figure Legend:

Figure 1 Flowchart of study identification and selection



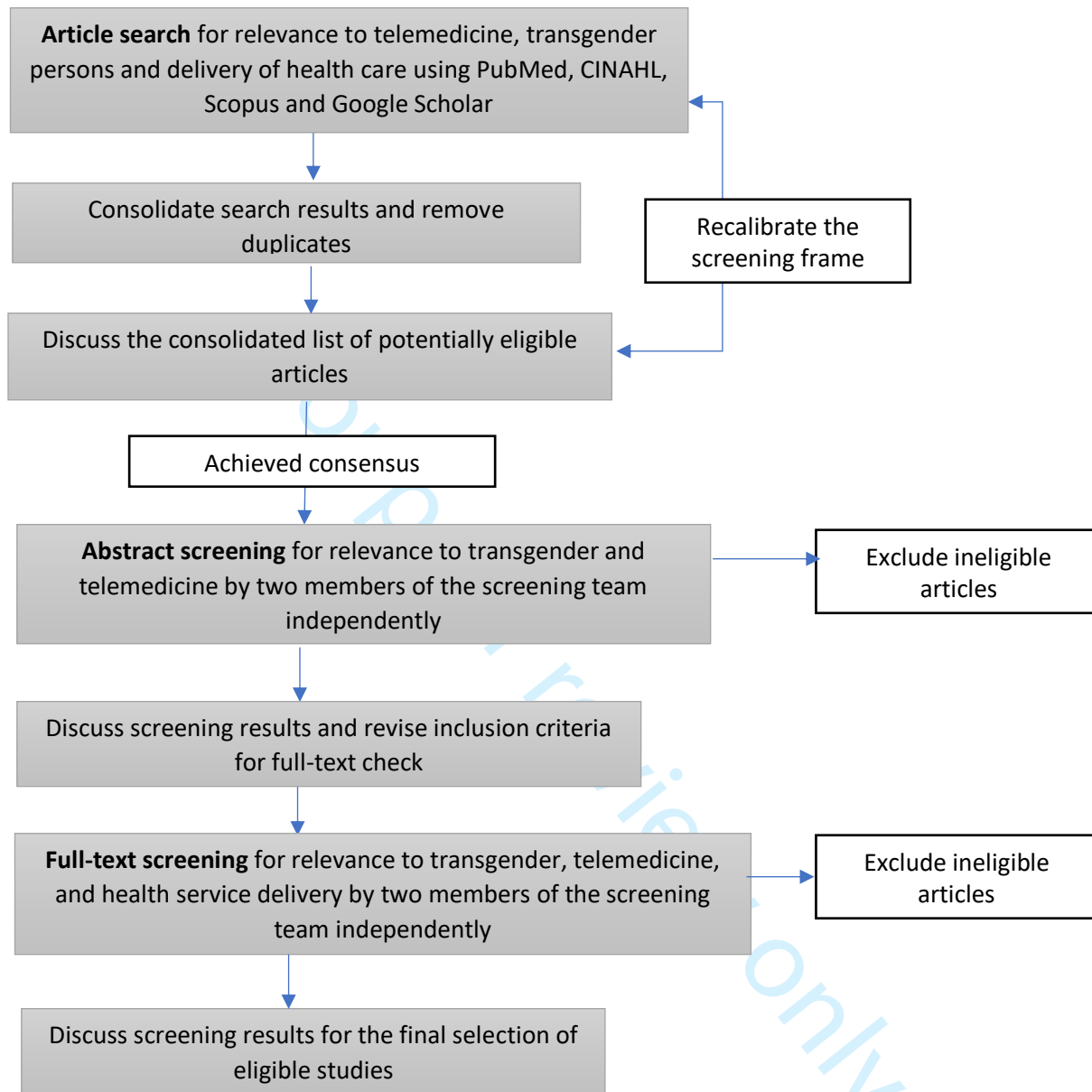


Figure 1 Flowchart of study identification and selection