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What are Patient Preferences for Virtual Consultations in an Orthopaedic Rehabilitation Setting?

by

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Thesis for the degree of Doctor of Philosophy

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Abstract

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The use of Virtual Consultations (VC) in healthcare has received significant interest from policy makers. The COVID-19 pandemic shone a spotlight on VC in practice; within the NHS, VC were rapidly implemented across outpatient departments. The role of patient preferences for VC is not yet fully understood.

This thesis consists of five published empirical research papers which collectively identify, characterise and explain patient preferences for VC in an orthopaedic rehabilitation setting. The papers were underpinned by an abductive approach. This thesis used Normalisation Process Theory, Burden of Treatment Theory and Preference Theory to guide the design, data collection and analysis of the studies.

The first paper reports a qualitative systematic review of literature about the use of VC in an orthopaedic rehabilitation setting. The second paper reports a qualitative interview study (*n* = 44) to understand the factors that influence patient preferences. The third paper is a Discrete Choice Experiment (DCE) to identify the importance of these factors for patients (*n* = 122). At this stage, the COVID-19 pandemic considerably shifted the context of the work as VC's were rapidly implemented in practice. The fourth paper reports qualitative interviews with patients (*n* = 13) to explore the results of the DCE and understand the impact of COVID-19 on preferences. The fifth and final paper is an investigation into the experiences of patients, clinicians and managers (*n* = 55) of the accelerated implementation of VC in practice.

These studies identified mechanisms that explain how patient preferences are constructed and how they relate to organisational and clinician preferences. Collectively, the five empirical papers from this thesis led to the cumulative development of a theory of patient preferences for VC. The thesis has demonstrated how this theory can be applied to clinical practice and a minimally disruptive model of care for VC has been developed.

Table of Contents

Table of Tables

Table of Figures

Research Thesis: Declaration of Authorship

Print name: Anthony William Gilbert

Title of thesis: What are Patient Preferences for Virtual Consultations in an Orthopaedic Rehabilitation Setting?

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. Parts of this work have been published as:

Gilbert, A.W., Jones, J., Stokes, M., Mentzakis, E. and May, C.R., 2019. Protocol for the CONNECT project: a mixed methods study investigating patient preferences for communication technology use in orthopaedic rehabilitation consultations. *BMJ open*, *9*(12).

Gilbert, A.W., Jones, J., Jaggi, A. and May, C.R., 2020. Use of virtual consultations in an orthopaedic rehabilitation setting: how do changes in the work of being a patient influence patient preferences? A systematic review and qualitative synthesis. *BMJ open*, *10*(9), p.e036197.

Gilbert, A.W., Billany, J.C., Adam, R., Martin, L., Tobin, R., Bagdai, S., Galvin, N., Farr, I., Allain, A., Davies, L. and Bateson, J., 2020. Rapid implementation of virtual clinics due to COVID-19: report and early evaluation of a quality improvement initiative. *BMJ open quality*, *9*(2), p.e000985.

Gilbert, A.W., Jones, J., Stokes, M. and May, C.R., 2021. Factors that influence patient preferences for virtual consultations in an orthopaedic rehabilitation setting: a qualitative study. *BMJ open*, *11*(2), p.e041038.

Gilbert, A.W., Davies, L., Doyle, J., Patel, S., Martin, L., Jagpal, D., Billany, J.C. and Bateson, J., 2021. Leadership reflections a year on from the rapid roll-out of virtual clinics due to COVID-19: a commentary. *BMJ Leader*. 5:188-192.

Gilbert, A.W., Mentzakis, E., May, C.R., Stokes, M. and Jones, J., 2021. Patient preferences for use of virtual consultations in an orthopaedic rehabilitation setting: Results from a discrete choice experiment. *Journal of Health Services Research & Policy*, p.13558196211035427.

Gilbert, A.W., May, C.R., Brown, H., Stokes, M. and Jones, J., 2021. A qualitative investigation into the results of a discrete choice experiment and the impact of COVID-19 on patient preferences for virtual consultations. *Archives of physiotherapy*, *11*(1), pp.1-13.

Gilbert, A.W., Jones, J., Stokes, M. and May, C.R., 2022. Patient, clinician and manager experience of the accelerated implementation of virtual consultations following COVID-19: A qualitative study of preferences in a tertiary orthopaedic rehabilitation setting. *Health Expectations*. 25: 775- 790.

8. The project supervisors, Dr Jeremy Jones, Professor Maria Stokes and Professor Carl May oversaw the design, conduct and write up for each of these papers. Dr Emmanouil Mentzakis provided assistance with the Discrete Choice Experiment and he is therefore listed as a co-author on the protocol and the Discrete Choice Experiment. Ms Anju Jaggi provided assistance with the screening of articles in the systematic review and she is therefore listed as a co-author. Ms Hazel Brown provided assistance with the qualitative Discrete Choice Experiment study and she is therefore listed as a co-author. Members of the CONNECT Project PPI group helped design the research for this thesis. Kate Forrester provided support with the design of the images. No changes in intellectual content were made as a result of this assistance.
9. I designed, analysed and wrote this thesis with supervision, advice and comments from the project supervisors, Dr Jeremy Jones, Professor Maria Stokes and Professor Carl May.

Signature: ....Date: 14th July 2022

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I could not have completed this journey without the support of my family. Tom and William, you will be pleased to know, I might finally stop talking about my PhD now!

I dedicate this thesis to my mum, Debbie Gilbert. I hope this makes you proud.

Definitions and Abbreviations

ARC	Applied Research Collaboration
BOT	Burden of Treatment Theory
CFIR	Consolidated Framework for Implementation Research
COF	Clinic Outcome Form
DCE	Discrete Choice Experiment
F2F	face-to-face
IG	Information Governance
IT	Information Technology
MDM	Minimally Disruptive Medicine
NHS	National Health Service
NPT	Normalisation Process Theory
OA	Osteoarthritis
RNOH	Royal National Orthopaedic Centre
SOP	Standard Operating Procedure
TAM	Technology Acceptance Model
TEL	Telephone consultation
TPB	Theory of Planned Behaviour
UK	United Kingdom
CONNECT	Care in Orthopaedics, burdeN of treatmeNt and the Effect of Communication Technology
VC	Virtual Consultation
VID	Video Consultation

Chapter 1 Introduction

1.1 Background

This PhD thesis is about patient preferences for virtual consultations (VC). VC, such as telephone or video consultations, are the use of technology to support communication between a patient and a healthcare practitioner from a distance. Technologies like VC have been placed at the centre of global healthcare policy and are claimed to have the potential to improve the effectiveness of healthcare systems through efficiency gain strategies[1] and healthcare reform.[2] These technologies are cited to overcome geographical boundaries,[3] for instance, the Republic of Indonesia Health System Review,[1] stated 'A telemedicine network would enable patients in remote areas to have access to reliable medical consultations and at the same time health professionals in remote areas can also be supported through the use of telemedicine technology'. The NHS Long Term Plan[4] in the United Kingdom (UK) places technology at the centre of healthcare reform over the next ten years to 2029. This thesis seeks to understand what patients prefer about VC and what they do not. Patients are likely to choose to use VC for their care if that option is most preferable to them.[5] The knowledge generated from this PhD thesis will be of interest to patients, healthcare managers and policy makers because an understanding of patient preferences helps us to understand whether patients are likely to choose to implement VC or not. The forthcoming section will discuss relevant literature and policy in relation to VC and discuss the role of the COVID-19 pandemic in shaping the healthcare landscape.

1.2 Overview of relevant literature and policy

This thesis focuses on patient preferences for VC in orthopaedics and musculoskeletal rehabilitation. Musculoskeletal disease is the second largest cause of disability worldwide[6] and the leading cause of disability in England,[7] accounting for one of the highest causes of sickness. Pain from osteoarthritis (OA) has become a leading cause of disability and decreased productivity in older workers.[8] It is widely accepted that the presence of OA increases with age[9] although more than half of people with symptomatic OA are younger than 65.[10] Approximately one in five adults over the age of 45 have OA of the knee and one in nine have OA of the hip, with a prevalence of 18.2% and 10.9% respectively.[11] Overall, it is estimated that nearly 15.9 million people have OA in England.[12] It is likely that many of these younger people with OA will live several decades and require ongoing management that requires visits to healthcare practitioners. VC is an innovation that can support patients with musculoskeletal diseases, such as OA, to attend healthcare appointments without the need for travel.

This is an important thesis because technologies like VC continue to remain in the spotlight of healthcare policy. Policy-makers are enthusiastic for the use of digitally-mediated healthcare and policy has placed digital care as central to the future vision of the NHS in the UK. The NHS Five Year Forward View, published in 2013,[13] set out a vision for the future of the NHS. The Five Year Forward View highlighted the opportunities for digital; despite 86% of adults being able to access the internet in the UK, only 2% of patients used the internet to contact their GP; it called for family doctor appointments to be available on-line everywhere and a target was set for 95% of Primary Care patients in the UK to be offered e-consultation and other digital services in 2019.[14]

The NHS Long Term Plan,[4] published in 2019, showcased 'digital-first' as the way for every patient to receive fast access to convenient primary care. A central vision of the long-term plan was that digitally enabled primary and outpatient care would be mainstream across the NHS within ten years. Whilst these policies clearly outlined the potential opportunities for technologies such as VC they are founded on a set of assumptions about what service users want, the facilities available to them and they do not consider service user preferences. This PhD research intends to fill this gap in the literature and highlight the role of preferences for VC in practice.

Prior to starting this PhD research, there were several examples of research investigating the role of virtual consultations being used to support the management of musculoskeletal disorders in the literature. The Virtual Outreach Project[15] compared joint video consultations between hospital specialists, General Practitioners and their patients in the United Kingdom. The Virtual Outreach group reported significantly increased satisfaction compared to the face-to-face group. Skype, a free-to-access videoconferencing software, has been used across a range of clinical specialities.[16] The VOCAL study[17] found video outpatient consultations to be safe, effective and convenient in appropriate situations.

One systematic review and meta-analysis of trials of real-time telerehabilitation in musculoskeletal care[18] concluded that real-time telerehabilitation was superior to standard practice for the improvement of physical function. The pooled data from 13 studies was claimed to provide 'unequivocal evidence that the management of musculoskeletal conditions via real-time telerehabilitation is effective in improving physical functioning and disability, and pain' (p634), although not all data from trials were able to be pooled due to 'insufficient data.' Another systematic review of seventeen research studies (non trials) concluded that telerehabilitation using VC is a viable option for musculoskeletal physiotherapy services.[19] It was noted, however, that additional large-scale RCT's were needed. A gap was identified around understanding patient experience (which is likely to impact on patient preferences) and cost-effectiveness of VC (which is likely to impact on clinician and organisational preferences). Recommendations for practice included describing telerehabilitation in detail so a patient can understand what VC entails and offering a mixture of in-person appointments for “hands on” care to supplement VC.

The PhysioDirect randomised trial found physiotherapy telephone assessment as effective as face-to-face care for patients with musculoskeletal disorders. Although PhysioDirect was reported as effective, a qualitative investigation into the results of PhysioDirect[20] illuminated the fact that patients saw the telephone consultations as a first step to physiotherapy rather than a standalone solution. This is an important finding, as the extended waiting times have shown to have detrimental effects on people with musculoskeletal disorders[21] and some patients chose PhysioDirect to expedite care. Furthermore, some participants felt that the PhysioDirect service was impersonal and impaired the development of a good relationship with a physiotherapist. Patients see a good relationship with their physiotherapist as important for patient centredness[22] and the findings from the PhysioDirect study illuminate some of the barriers that might inhibit uptake in practice that were not reported within the main trial. An enhanced skill set was reported as required for telephone assessment and advice particularly in listening and communication skills. In addition to an initial training programme, even experienced physiotherapists benefited from a period of skill consolidation to become proficient and confident in assessing patients and delivering care using the telephone[23]. Communication style is an important consideration, particularly when faced with latency (technology related delay in transmission) within clinical consultations[24].

Another trial of physiotherapy telephone advice for people with knee arthritis found that telephone advice modestly improved physical function but not the primary outcome of knee pain at 6 months[25]. Furthermore, functional benefits were not sustained at 12 months. Advantages of VC include its convenience and accessibility, whereas challenges for VC include patient safety, privacy and workforce willingness to use.[26] Should a patient have concerns around the safety and effectiveness of VC, or a clinician be unwilling to use VC, overall preferences may not be in favour of VC care. Further research into preferences are required.

Standalone qualitative literature provides additional context to trials and reviews of VC. Lawford et al’s study of telephone-delivered exercise therapy for physiotherapists for people with knee arthritis[27] found that although patients were initially skeptical, they reported positive experiences. Although some patients wanted visual feedback, it was seen as an option that could increase the accessibility of services. A follow up study published about clinician perspectives of telephone physiotherapy[28] found that once clinicians had experienced telephone care, their position shifted from one of scepticism and that first-hand experience is necessary for physiotherapists to embrace new models of care.

Although many of these research studies reported favourable and equivalent VC practice for musculoskeletal care, widespread uptake in clinical practice in the UK remained low. The NHS Long Term Plan[4] set the scene for 'digitally-enabled primary and outpatient care to go mainstream across the NHS' over the next 10 years. Although research into VC has reported high levels of satisfaction[29] and equivalence to in-person care[23,25], whether or not clinicians and patients are willing to use VC demands further attention[28].

The COVID-19 pandemic accelerated the introduction of VC across the NHS. In response to the pandemic, the NHS released new Information Governance guidance to support the use of VC practice[30] and NHS England made the video consultation platform 'Attend Anywhere' available to all NHS Trusts in England. At the site of my PhD research, the Royal National Orthopaedic Hospital (RNOH), VC was rapidly introduced in practice because of the pandemic.[31] This NHS vision of the NHS Long Term plan was realised during COVID-19, with 170 healthcare organisations in England utilising 'Attend Anywhere' from March 2020 onwards.[32]

The COVID-19 pandemic led to a huge influx in research investigating VC. The context for research investigating VC changed considerably; one systematic review and meta-analysis, published after the COVID-19 pandemic, described the use of VC as absolute 'necessity'[33]. A review of 11 studies (published before the COVID-19 pandemic) found patient and clinician satisfaction to be equivalent and a greater improvement in visual analogue scale for pain in in-person clinics compared to VC. Three studies reported comparative scores for overall functionality and six studies reported equivalence in physical measures of functionality. Although VC was not proven to be more effective than traditional in-person visits, VC was described as serving as 'an integral aspect of healthcare de- livery throughout the current COVID-19 pandemic and beyond in an effort to deliver safe, efficient and time-sensitive care to the orthopaedic patient population.' Several other systematic reviews of data published prior to the pandemic indicate a promising future for VC.[34-36] To my knowledge, there are no reviews of primary research conducted into VC's since the onset of the COVID-19 pandemic.

Of the academic research papers published on the use of VC due to COVID-19, the papers highlight the success of VC avoiding the need for in person consultations[37-43]and high levels of satisfaction[37-39,41,42]and cost savings[40]. Some studies have reported the challenges of VC (such as challenges with delivering virtual care and integrating this within the patient pathway[43] and situations where patients clinical progression is delayed due to suboptimal assessments)[44] and issues with VC (such as safeguarding, safety and security[45] and medicolegal issues)[45,46].

The COVID-19 pandemic brought with it a sense of urgency to implement VC. One review of the changing depictions of VC reported in newspapers in the UK found that during the first wave of the pandemic (March 2020) the narrative evolved from one talking about the efficiency and safety of VC to stop the spread of COVID-19 to a narrative of risks, equalities and lack of choice during the second wave (December 2020). The context for my PhD research (prior to and during COVID-19) changed dramatically and influenced the data underpinning the results of this research.

As VC use became mainstream across healthcare, clinicians found that they grew to accept this approach[47], which is in keeping with literature published prior to the pandemic[28]. However, although satisfaction for VC was high prior to the pandemic, the patients entering into these studies all did so willingly. Furthermore, patients who reported satisfaction with VC during the pandemic did so on the backdrop of a global pandemic and for many VC was the only way to access care. A study conducted at the site of this PhD research reported high satisfaction for VC use, but despite this less than half of patients and clinicians indicated a preference to use VC in the future. Patient satisfaction does not necessarily indicate willingness to use in the future. To my knowledge, there are no trials of VC conducted after COVID-19 and there are no reviews of primary research into VC conducted beyond the pandemic.

Prior to the pandemic, phone consultations were routinely used within the NHS to contact patients whereas the rate of video consultations was low. During the pandemic, both phone and video calls were normalised across the NHS in England following significant investment in resources to support the deployment of VC.[32] The pandemic led to rapid policy implementation and practice change and this PhD needed to respond to these events and uncertainties. This PhD research provided the opportunity to extend the work of investigating preferences before the pandemic, to also investigate how these were shaped during the height of and in the transition from the COVID-19 pandemic. This was a unique opportunity to investigate how the accelerated implementation of VC shaped user experiences and how, in turn, this influences preferences. The outputs of the research have already shaped service delivery and local policies and are well placed to shape national policies, particularly in musculoskeletal care.

1.3 Personal perspective

This thesis outlines the work undertaken for my PhD. I qualified as a Physiotherapist in 2010 and have developed a clinical interest in the management of complex orthopaedic conditions. I am based clinically at a National Specialist Orthopaedic Hospital (the Royal National Orthopaedic Hospital (RNOH) based in Stanmore). As a clinical physiotherapist, I interact with patients who have travelled from all over the country to access surgical and rehabilitation consultations and observed first-hand how much of a challenge this can be for patients. Some patients find it frustrating when they would travel long distances and hands-on treatment did not feature within the rehabilitation consultation. Anecdotally, some patients told me that the extensive travel required to attend rehabilitation and surgical appointments is a challenge for them. This inspired my interest to see if the use of remote consultations could help patients engage with rehabilitation without the need for travel.

I completed a Masters in Clinical Research (MRes) in 2015. For my dissertation, I investigated the acceptability of real time 1:1 videoconferencing consultations (VC) for patients and clinicians in an orthopaedic setting. This work involved a systematic review of qualitative research studies that concluded that the use of VC was acceptable to patients.[48] However, the review did not provide insight into its acceptability to clinicians. For my MRes dissertation I completed an empirical research study to understand the acceptability of VC for patients and clinicians, which concluded that the use of SKYPE was acceptable to all clinicians providing that patients made an informed decision about its use.[49] SKYPE was acceptable to half of the patients within the study. Some of the patients who chose to have a face-to-face consultation felt that SKYPE would have been acceptable under different conditions. This perspective agrees with my clinical experience of patients and I believe that preferences are not fixed but they are fluid and dependent on the patient’s situation.

My previous experiences inspired this PhD investigation. The CONNECT project explored the situations where patients choose to use (or not use) VC for their rehabilitation consultations. I acknowledge that I have developed assumptions about patient preferences prior to starting this work. Throughout the PhD process I maintained a reflexivity diary about these data throughout collection and analysis. I reflected on my assumptions, as the interpretant of these data, as these arose. I have provided a summary account of these within the reflexivity section of the discussion (within section 9.9 on page 247).

I was based at RNOH during the COVID-19 Pandemic and was involved in the operational roll out of VC at the hospital. At this time, the research changed from a carefully planned research investigation (where VC was going to be trialled in practice as an experimental pathway) to an accelerated programme of implementation. I shared results from the earlier Phases of the CONNECT Project (Phase I-III) with the RNOH implementation group and these findings were considered throughout the accelerated implementation of VC. The pandemic required me to deviate from the protocol of the research as it provided me the opportunity to track the changing state of affairs as they unfolded in practice. The subsequent research conducted after the outbreak of COVID-19 (Phase IIIb and Phase IV) are the responses to the events that unfolded. Please refer to Chapter 6 on page 131 for a brief description of the changes made as a result of COVID-19.

1.4 The importance of this thesis

This thesis is important because it investigates how patients form their preferences for VC. An assumption of rational choice theory suggests that a patient will choose the option they most prefer.[5] Patients will prefer the option they identify as bringing them more value. A thorough understanding of preferences will be important to shape the way services are designed and delivered in the future. Services that have been designed with patient preferences in mind may have a more optimal uptake and lead to increased value for patients. In Section 1.5 of the thesis, I outline the research question, aims and objectives to fill this important gap in the literature.

1.5 Research Question, Aims and Objectives

This thesis reports the findings of the **C**are in **O**rthopaedics, burde**N** of treatme**N**t and **E**ffect of **C**ommunication **T**echnology (**CONNECT**) Project, a series of studies that have been conducted to investigate patient preferences for virtual consultations in an orthopaedic rehabilitation setting. The research investigates the **E**ffect of **C**ommunication **T**echnology on the work of being a patient (for this, Normalisation Process Theory[50] (NPT) was used), how this work shapes patient experiences and burde**N** of treatme**N**t (for this, burden of treatment theory[51] (BoT) was used) to understand how this influences patient preferences (for this, preference theory[5] was used). These findings led to the development of a pathway of **C**are in **O**rthopaedics, underpinned by patient preferences, which uses VC (underpinned by the concept of Minimally Disruptive Medicine[52]).

1.5.1 Research Question

What are patient preferences for VC in orthopaedic rehabilitation?

1.5.2 Aim

The CONNECT Project aims to identify, characterise and explain patient preferences for VC in orthopaedic rehabilitation.

1.5.3 Objectives

The objectives of the CONNECT Project are to understand:

1. The ‘work’ of being a patient when using VC and how this influences preferences (Phase I);
2. The factors that influence patient preferences for VC (Phase II);

3. The relative importance of factors that influence patient preferences for VC (Phase III);
4. What a ‘minimally disruptive’ VC supported orthopaedic rehabilitation pathway looks like in practice (Phase IV).

1.6 Overview of relevant theories used within this thesis

In this section I want to make clear the link between the aims and objectives and their grounding in theory.

1.6.1 Overview of theories considered within this thesis

This PhD research used Preference Theory[5], Normalisation Process Theory[50], Burden of Treatment Theory[51] and Minimally Disruptive Medicine.[52] During the planning stage of this PhD thesis, I considered a range of possible theories. In this section, I outline some of the retained and disregarded theories to achieve the aims and objectives of this research.

1.6.1.1 Preference Theory

Preferences are a set of complex factors that directly cause choice. Preferences may include enjoyment comparisons *(x to y is preferred if someone enjoys x more than they enjoy y)*, comparative evaluations *(x to y is preferred if someone thinks x is better than y)*, favouring *(selecting x over y because x has a particular set of characteristics)* or choice ranking *(x is chosen over y if and only if they are faced with a choice of x over y).*[5] Preferences are cognitively demanding and can be defined as a ‘total subjective comparative evaluation’.[53] *Total* means that someone will consider all the relevant factors; *subjective* means influenced by thoughts, feelings and beliefs; *comparative* means to compare one option verses another and *evaluation* means judgement. In essence, someone will prefer x over y after consideration of the alternatives, the actions, the state of affairs and the consequences of choosing each alternative.

Prior to undertaking this PhD I spent a considerable amount of time understanding preference theory. ‘Stated preferences’ are when an individual states what option they prefer. Questions around stated preferences are always hypothetical and may not be indicative of actual behaviour.[54] One of the challenges of undertaking a PhD investigating patient preferences, is that the data collection methods (such as a Discrete Choice Experiment) are artificial and are independent of context.[55] A ‘revealed preference,’ is when an individual is asked to choose and enact the alternative they prefer. However, at the time, revealed preference data collection techniques about VC were not possible because VC was not available prior to the pandemic and in-person care was not available during the height of COVID-19.

One further consideration regarding the use of preference theory within this thesis was that the use of preference theory does not take into account context. Healthcare is complex and in order to understand patient preferences for VC it was felt that additional theories, epistemologically favourable to work with preference theory, were needed to support explanations of preferences in a healthcare context. Throughout the CONNECT Project, the preference definition of a 'total subjective comparative evaluation' was used.

As this research sought to understand the factors that influence a total subjective comparative evaluation, additional theories were required to provide context for preferences. These theories are discussed below.

1.6.1.2 The Theory of Planned Behaviour

The theory of planned behaviour (TPB) is a psychological theory that links attitudes and beliefs to behavour.[56] TBP attempts to explain how attitudes, subjective norms, perceived behavioural control and intentions influence an individuals behaviour. One challenge of TBM is that prior to COVID-19 VC use was not widespread and *subjective norms* were in favour of in-person care. in these situations, perceived behavioural control was likely to be limited due to the lack of VC actually on offer. Attitudes are an important consideration when it comes to preference as attitudes are likely reflect perceived value and ultimately preferences for VC. TPB has been shown to have value when predicting behaviour for some individuals planning to undertake physical activity.[57] A review of 237 independent prospective tests found that TPB predicted only 23.9% physical activity behaviour with intention being the strongest predictor.[58] Sniehotta et al[59] argued to 'retire' the theory of planned behaviour because it was found to be considerably less predictive of behaviour when studies use a longitudinal design, when participants are not university students and when outcome measures are taken objectively.[58] The subjective norm construct was found to be a weak predictor of intentions.[60] In relation to this PhD research, TPB depends upon the degree of actual control of the behaviour and, in the context of healthcare, if there are not viable VC pathways for a patient to choose it is not possible for patients to plan to use them.

Whilst the notion of attitudes and beliefs are helpful to support the identification of preferences, one limiting factor for patients undertaking a total subjective comparative evaluation is the degree to which the theory can help explain patient preferences for VC. The limitation of TPB theory in the context of this thesis is that it is unlikely to be able to explain how patients decide their preferences for a hypothetical mode of practice. Although TPB specifies the relationships between attitudes, subjective norms and intentions, it doesn't say how these intentions get enacted in practice. It is for this reason I decided not to use TPB for my research.

1.6.1.3 Technology Acceptance Model

The technology acceptance model (TAM) was developed by Davis[61] to find out what factors cause people to accept or reject Information Technology (IT), such as VC. Perceived usefulness (defined as "the degree to which a person believes that using a particular system would enhance his or her job performance") and perceived ease of use (defined as ""the degree to which a person believes that using a particular system would be free of effort") are highlighted as the two most important factors about using IT. Perceived usefulness was defined as the strongest predictor of an individuals intention to use IT.[61]

The TAM has been used within physiotherapy to understand perspectives on the use of wearable technology,[62] telerehabilitation platforms,[63] exoskeletons[64] and posture assessment tools.[65] The use of TAM within these studies highlighted specifics around perceived usability, which would helpful to understand preferences for VC. One challenge with using TAM as an approach to this research is that focusing on perceived usefulness and ease of use is that there may have been situations where patients were not familiar with the technology. This PhD research required an underpinning theory that went beyond perceived ease of use and usefulness. Furthermore, TAM does not offer explanations about barriers to integrating technology into practice[64] and my previous MRes work[49] highlighted the importance of context in determining acceptability and planned use. It was decided that an implementation theory would be better served to underpin this PhD research as it would focus attention on the things that are likely to lead to VC being taken up in practice.

1.6.1.4 Consolidated Framework for Implementation Research

The Consolidated Framwework for Implementation Research (CFIR) was introduced in 2009 by Laura Damschroeder and colleagues.[66] The purpose of CFIR was to provide a menu of constructs that have been associated with effective implementation. The development of CFIR consisted of the consolidation of nineteen published theories of implementation. The authors combined constructs to create five major domains (intervention characteristics, outer setting, inner setting, characteristics of the individuals involved, and the process of implementation). CFIR has been widely used across healthcare and the original *Implementation Science* paper[66] has been cited over 5000 times. As with TPB and TAM, aspects of CFIR rely on perceived advantage and adapdability; at the time of undertaking this research, VC was not widely used or able to be trialled within practice. CFIR advocates for piloting as it 'allows individuals and groups to build experience and expertise, and time to reflect and test the intervention' (p6). Whilst CFIR would be well placed to guide implementation, the purpose of the CONNECT project was to understand patients preferences for VC and to design a model of care based on these preferences. CFIR was not ideally placed to explore preferences as it is a framework to guide implementation of a pathway, rather than design the pathway. It was decided, for this PhD research, that an alternative theory would likely be better placed to understand patient preferences.

1.6.1.5 Normalisation Process Theory

The process of implementing a new intervention (such as the introduction of VC in healthcare) has been demonstrated to be dependent on how the intervention is operationalised by its users,[67] the "work" people do when they implement a new intervention,[68] the mobilisation of resources over time[69] and across different settings[70]. Normalisation Process Theory (NPT) frames implementation processes through its focus on the things people *do* when they implement a new intervention in practice[50].

NPT is useful for an empirical investigation such as this for several reasons. Firstly, NPT was developed over several iterations and is underpinned by empirical data.[68] NPT has been shown to be well positioned to be used with other theories[69] (such as theories of Structure and Action[71], Socio-technical change[72] and social cognitive psychology[73]). NPT has been used empirically in feasibility studies and process evaluations of complex healthcare interventions,[74] and in the evaluation of remote consulting in primary care.[75] Although the scope of this thesis ends with the design of a new patient pathway, the application of NPT to support the design[76] and implementation[77,78] of complex interventions and trials[79] is well documented and the use of NPT leads to an understanding of the factors that lead to successful implementation.

NPT has been used in conjunction with many other approaches and theories. It has been used to explain patient experience[51], has been used with principles of co-production,[80] action research[81] and with realist reviews[82] and evaluations[83]. Furthermore, NPT has been shown to sit well other paradigms, such as with theories of health organisation and management[84]. The knowledge generated from an investigation about patient preferences for VC using NPT and preference theory provides an understanding of how implementation factors shape preferences. The CONNECT Project investigates how the work people do when implementing a VC shapes their preferences and NPT was used to focus attention on the work of implementation.

Although NPT has a natural fit with the research topic, I had to consider the drawbacks of using NPT. I was familiar with NPT through my use with the theory during my MRes.[48,49] One challenge of using NPT that has been consistently reported in the literature is the challenge of discerning the difference between constructs.[85] Although a coding manual for NPT has now been developed,[86] at the time of starting the research this did not exist. Personally, I find the language within the NPT papers challenging to understand and there was always a risk I could misinterpret the data. Several authors reported some of their findings fell outside of the NPT coding framework[87-89] where data was too general to be coded. One potential problem I faced, having some previous experience with the theory, was that I could misinterpret data which could lead to issues with coding decisions. To overcome this, during Phase 1 & 2 the focus of the research was limited to *collective action* (work). The full theory was used when I had access to the coding manual[86] in Phase 4. In addition, I had access to supervisory support from colleagues who had been involved in the development of NPT to support coding decisions.

NPT was chosen as the underpinning theoretical approach because it is appropriate to the phenomena of interest and has been shown to be a versatile way to understand implementation processes across a range of settings and stages of the implementation journey. NPT inspired the development of Burden of Treatment Theory[87] and has been shown to work well with other theories. Whilst NPT has not yet, to my knowledge, been used with preference theory it is epistemologically positioned in such a way that it is welcoming to other perspectives. NPT is epistemologically suited to an investigation which sets out to use multiple theories to understand patient preferences.

1.6.1.6 Burden of Treatment Theory

NPT has been used to determine the components of patient 'work' in chronic heart failure,[87] stroke and diabetes[90] and Chronic Obstructive Pulmonary Disease and lung cancer.[91] Patient work in heart failure includes developing an understanding of treatments, interacting with others to organise care, attending appointments, taking medications, enacting lifestyle measures and appraising treatments.

Burden of treatment theory (BOT)[51] is a theory of patient experience that explains how the capacity for action interacts with the work that stems from healthcare. The CONNECT Project investigates the factors that contribute towards burden of treatment and how burden of treatment differs between face-to-face consultations (FF) and virtual consultations (VC).

Having been at the RNOH for over a decade, I obtained experience of working with patients who need to access tertiary care. Whilst, for some, travelling to a tertiary centre is challenging, I have also seen how helpful the experience of in-person care is for many of our patients. When I explored the acceptability of VC,[49] even though some patients found the travel hard, they still wanted to attend in-person. This showed me the importance of understanding how patients' experiences influence their preferences.

One challenge of using BOT is that it is underpinned by NPT and that any misinterpretation of NPT could lead to misinterpretation of BOT. Gallacher et al[87] found that when using NPT to outline the work of patients it did not encompass all types of work (such as emotional work). It was decided not to apply a rigid coding frame to the qualitative components of the research but to use BOT within this thesis to provide the link between patient work and experience and how these influence preferences. BOT is epistemologically positioned in a way that it complements NPT and it is well placed to provide additional context when combined with preference theory to investigate patent preferences for VC.

1.6.1.7 Minimally Disruptive Medicine

Minimally Disruptive Medicine (MDM)[52] is an approach to healthcare that seeks to reduce the workload for the patient and caregiver. MDM seeks to advance patient goals for healthcare using effective care programmes designed and implemented in a manner that minimises the negative impact the care programme imposes on their lives.[92] A 'minimally disruptive' orthopaedic rehabilitation consultation is a consultation that:

1. Has minimal negative imposition on the patient's life.
2. Offers a reduced workload for the patient.
3. Ensures healthcare professionals and care are accessible to the patient.

Preference theory suggests that a patient will prefer the alternative that yields the most utility.[5] I am therefore looking to design a pathway that takes into account preferences, patient workload and experience, that will yield utility to the patient. I believe a treatment pathway that considers these preferences will be of use to patients, clinicians, managers and policy makers within healthcare, as it will be more likely to be taken up by patients.

An output of the CONNECT Project is the design a 'minimally disruptive' VC supported rehabilitation pathway informed by patient preferences. This is underpinned by Phase I – Phase IV and is reported within the discussion section of this thesis.

1.7 Philosophical Underpinning

This is practice-based research thesis that draws on the philosophical underpinnings of pragmatism and abduction to explore the highly practical problem of designing patient pathways underpinned by patient preferences.

1.7.1 Ontology

This thesis is set within the philosophical tradition of Pragmatism. This approach sits well with my view of the world as a physiotherapist. I have always tried to offer individualised, hoslistic care based on the needs of individual patients. I believe that this approach is best suited to the complexities of healthcare research as a range of issues within healthcare demand a range of approaches to understand and address these.

The purpose of the CONNECT Project was to explain patient preferences based on empirical data from the research. The CONNECT Project aimed to design a minimally disruptive pathway based on the insights obtained from the research across all Phases of the research.

The origins of pragmatist philosophy are attributed to the American Scientist and Philosopher Charles S Peirce. Peirce's two articles: 'The fixation of belief'[93] and 'How to make our ideas clear'[94] are considered the foundations of pragmatism. Peirce[93] was of the view that belief will always be challenged by others who have differing opinions 'unless we make ourselves hermits.' He argued that humans may form beliefs that go beyond what logic would justify and that the questioning of belief, originating from differing opinion, should be celebrated.[93] Peirce called for clear and distinct propositions as a basis for further inquiry.[94]

Peirce's work significantly contributed to our understanding of the construction of meanings. Peirce argued that meaning making consists of three interlinked parts: a sign, an object and an interpretant. Peirce's semiotic triad of the sign, the object and the interpretant are intrinsically connected in the act of meaning making.

The CONNECT Project is a clinical thesis which is intended to set out a plan for action. Propositions were therefore developed in a clear and distinct manner, in accordance with Peirce's guiding principles, to facilitate change within the healthcare system. I have embraced Peirce's position on meaning making throughout this research. As the interpretant, I am aware of my influence in the research and set out the steps I took to enhance the credibility of the research within each individual paper. Furthermore, I have made my position and role within the research explicit and reflected on this within the discussion section of the thesis (please refer to section 9.9 on page 247 for the 'Reflexivity' section of the thesis).

1.7.2 Epistemology

The CONNECT project is epistemologically set within the abduction paradigm,[95] inspired by American pragmatism and the work of Peirce. Abduction is the process of building inferences from the available evidence. Research following an abductive approach seeks to identify the 'best' inference, from a range of alternatives, and used this to build explanatory models and form propositions. Abduction depends on the interplay of observations (the sign and the object) and the inference (a conclusion reached based on evidence and reasoning). Such inferences are shaped by the interpretant (which is in turn dependent on how their socially cultivated position and thoughts shape the interpretant). Within this research, I was the interpretant and have accounted for my role within the research in the ‘reflexivity’ section (please refer to section 9.9 on page 247 for the ‘Reflexivity’ section of the thesis).

1.7.3 Application in Practice

The ontological and epistemological position of this thesis shaped the methods of the research. Although I planned to conduct the research across two sites (initially Stanmore Hospital and Bolsover St at the RNOH, I added the Nuffield Orthopaedic Centre in Oxford following my first progression review), the COVID-19 pandemic meant that I was only able to conduct the research within my clinical department.

Accumulation of a large volume of interview data has the potential to be familiar (as I work within the clinical department and I am aware of many of the processes), messy and confusing which could hinder creative thinking and theorising. All data went through a process of defamiliarisation[95] to enable a deeper appreciation of the data. All data were identified (in accordance with Peirce’s semiotic sign) and assigned a code of what this means (by the interpretant - me) using the ‘node’ function in NVIVO software. Codes were classified in accordance with the code’s meaning in relation to the research question. A process of back and forward tracking between the data and the codes took place to desensitise my observations to identify new flashes of insight. In accordance with the philosophical tradition of pragmatism propositions about the research were claimed when they worked satisfactorily.

Although I am not an epistemologist, it is important to emphasise that this is a pragmatic thesis and the underpinning epistemological thread of the research was shaped by this. My underpinning epistemological view of the world, as a pragmatic physiotherapist, marries up with the approach I took with this work. The work I undertook within the thesis started out as a protocolised series of studies that intended to inform the development of a new treatment pathway. What actually happened, was that the research needed to change in response to the COVID-19 pandemic. I feel very strongly that clinical research needs to influence clinical practice and I have made it clear within the thesis where earlier stages of the CONNECT Project influenced service delivery during the RNOH’s pandemic response. Although the accelerated implementation of VC was never intended within the protocol of the work, I feel it is important to include some of this context within the thesis and I therefore present two additional papers within the Appendix (see Appendix A on page 279 and Appendix B on page 299). I was lead author for both of these publications; the first paper describes the rapid implementation of VC within the RNOH[31] and the second paper describes the reflections of this work by hospital leaders.[96] Phase IV of the CONNECT Project was an investigation into the experiences of the accelerated implementation of VC and I believe the inclusion of the papers in the thesis is essential, because of its impact on me as a researcher and the impact on the overall research.

This thesis embraced pragmatism and responded to these events and uncertainties presented by the COVID-19 pandemic.

1.8 Overview of the Thesis

Although this is a three paper thesis I am actually presenting 5 papers to characterise the journey to the development of a theory explaining patient preferences for VC in an orthopaedic rehabilitation setting. In addition, I have included two published papers within the appendix (see Appendix A and Appendix B) to demonstrate how this PhD research shaped the rapid implementation of VC at RNOH during the COVID-19 pandemic.

This thesis is presented as an introduction, protocol and five empirical papers followed by an integrative essay. The structure of the thesis is as follows:

- Chapter 2 on page 19 is the original protocol for the research published in *BMJ Open*.[97]
- Chapter 3 on page 33 is a qualitative systematic review investigating the work of being a patient with the use of VC published in *BMJ Open*.[98]
- Chapter 4 on page 61 is a qualitative study investigating the factors that influence preferences for patients in an orthopaedic rehabilitation setting published in *BMJ Open*.[99]
- Chapter 5 on page 103 is a Discrete Choice Experiment (DCE) that quantitatively tests the influence of factors on patient preferences for VC published in the *Journal of Health Services Research*.[100] This Phase was prematurely terminated due to the COVID-19 pandemic.
- Chapter 6 on page 131 is a brief description of the impact of the COVID-19 pandemic at RNOH. The COVID-19 pandemic led to a break in the published protocol as the CONNECT

Project was forced to change from an experimental study to an investigation into the accelerated implementation of VC in practice.

- Chapter 7 on page 133 is an additional empirical investigation to gain insights into the results of the DCE, and to understand the influence of COVID-19 on preference published in *Archives of Physiotherapy*.[100]
- Chapter 8 on page 165 is an investigation into the experiences of patients, clinicians and managers' experiences of the accelerated implementation of VC due to COVID-19. This paper is published in *Health Expectations*.[101]

The discussion of this thesis (on page 211) forms an integrative essay where I provide the overview of a theory of patient preferences, developed from the empirical investigations conducted within this thesis. I offer a critique of the research and propose future ideas for research. I then provide a reflexive essay in section 9.9 on page 247 where I critically examine my role in the research and consider how the events that unfolded over my career, and in particularly during my PhD, have shaped how I see myself as a clinical researcher in practice. I then conclude the thesis. A visual overview of the thesis can be seen in Figure 1 on page 18.

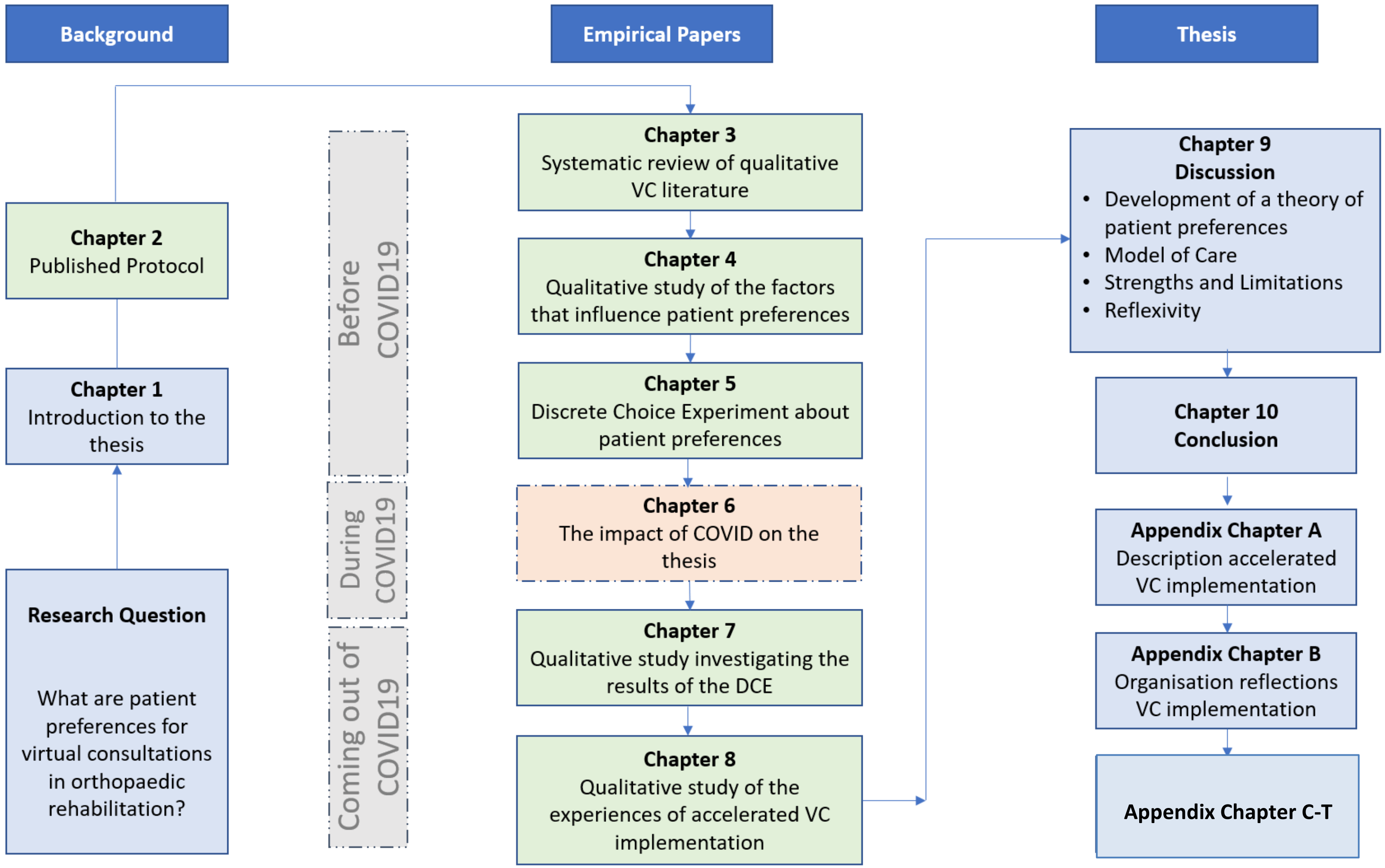

Figure 1 Overview of the Thesis

Chapter 2 Protocol for the CONNECT Project: a mixed methods study investigating patient preferences for communication technology use in orthopaedic rehabilitation consultations

This paper has been published in BMJ Open and is included as a 'published version'. The full reference for this paper is: Gilbert AW, Jones J, Stokes M, Mentzakis E, May CR. Protocol for the connect project: a mixed methods study investigating patient preferences for communication technology use in orthopaedic rehabilitation consultations. BMJ open. 2019 Dec 1;9(12):e035210. The formatting, spelling, and referencing for this paper are presented according to the journal's style requirements. In line with the Creative Commons license under which this paper was published, and the publisher's rights and permissions for open access publications, no additional permissions are required to include this article in this thesis as long as the appropriate citation is made.

2.1 Abstract

Introduction

Technology has been placed at the centre of global health policy and has been cited as having the potential to increase efficiency and remove geographical boundaries for patients to access care. Communication technology may support patients with orthopaedic problems which is one of the leading causes of disability worldwide. There are several examples of technology being used in clinical research although uptake in practice remains low. An understanding of patient preferences will support the design of a communication technology supported treatment pathway for patients undergoing orthopaedic rehabilitation.

Methods and Analysis

This mixed methods project will be conducted in four Phases. In Phase 1 a systematic review of qualitative studies reporting communication technology use for orthopaedic rehabilitation will be conducted to devise a taxonomy of tasks patients face when using these technologies to access their care. In Phase 2 qualitative interviews will investigate how the work of being a patient

changes during face-to-face and communication technology consultations and how these changes influence preference. In Phase 3 a Discrete Choice Experiment will investigate the factors that influence preferences for the use of communication technology for orthopaedic rehabilitation consultations. Phase 4 will be a practical application of these results. We will design a ‘minimally disruptive’ communication technology supported pathway for patients undergoing orthopaedic rehabilitation.

Ethics and Dissemination

The design of a pathway and underpinning patient preference will assist in understanding factors which might influence technology implementation for clinical care. This study requires ethical approval for Phase 2, 3 and 4. Approvals have been received for Phase 2 (Approval received 4th December 2018 from the South Central-Oxford C Research Ethics Committee [IRAS ID: 255172, REC Reference 18/SC/0663) and 3 (Approval received 18th October 2019 from the London-Hampstead Research Ethics Committee [IRAS ID: 248064, REC Reference 19/LO/1586]) and will be sought for Phase 4. All participants will provide informed written consent prior to being enrolled onto the study.

Registration

PROSPERO registration number: ID=CRD42018100896.

Strengths and Limitations of this Study

- A taxonomy of patient ‘work’ and characterisation of patient preferences when using communication technology will assist in understanding implementation processes.
- This combination of sociological and economic research methods is novel: there are very few studies of patient preferences in telemedicine research.
- The design of a new consultation pathway, underpinned by patient preferences, may enhance the prospects of successful implementation in practice.
- This research is being conducted across two sites and may not be representative of the NHS nationwide.

2.2 Introduction

Technology has been placed at the center of global healthcare policy. Technology has been cited as having the potential to improve the effectiveness of healthcare systems through efficiency gain strategies[1] and healthcare reform.[2] Technology may overcome geographical boundaries[3] with one example, from the Republic of Indonesia Health System Review,[1] stating 'A telemedicine network would enable patients in remote areas to have access to reliable medical consultations, and at the same time health professionals in remote areas can also be supported through the use of telemedicine technology'. In the United Kingdom, as outlined in the NHS Long Term Plan,[4] digital-first primary care will become a new option for every patient intending to provide fast access to convenient primary care with 95% of GP patients to be offered e-consultation and other digital services in 2019.[14]

Musculoskeletal disease is the second largest cause of disability worldwide.[6] It is widely accepted that the presence of osteoarthritis (OA) increases with age[9] although more than half of people with symptomatic OA are younger than 65.[10] It is likely that many of these younger people will live for another 2-3 decades and require ongoing support and management that requires visits to healthcare practitioners. Communication technology, the use of technology to support the communication from a distance, is a digital innovation that can support patients to attend appointments.

There are several examples of communication technology to support the management of musculoskeletal disorders in the literature. The Virtual Outreach Project[15] compared joint teleconsultations between hospital specialists, General Practitioners and their patients in the United Kingdom and found the Virtual Outreach group to have significant increases in satisfaction compared to the face-to-face group. PhysioDirect[102] telephone assessment was found to be as effective as face-to-face care for patients with musculoskeletal disorders accessing their care via phone. Skype, a free-to-access videoconferencing software, has been used across a range of clinical specialities.[16] Greenhalgh's VOCAL study[17] found video outpatient consultations to be safe, effective and convenient in appropriate situations. Our previous research found the use of Skype videoconferencing for patients with shoulder instability to be acceptable for half of the patients.[49] In our study, there were several factors that influenced patient's choices between face-to-face and Skype consultations. We believe that further research on this area may assist with implementation of communication technology in clinical practice.

The process of implementing a new intervention (such as the introduction of communication technology in healthcare) has been demonstrated to be dependent on how the intervention is operationalised by its users,[67] the "work" people do when they implement a new intervention,[68] the mobilisation of resources over time[69] across different settings.[70] Normalisation Process Theory (NPT) frames implementation processes through its focus on the things people *do* when they implement a new intervention in practice and provides the theoretical underpinning of Phase 1.

NPT has been used to determine the components of patient "work" in chronic heart failure,[87] stroke and diabetes[90] and Chronic Obstructive Pulmonary Disease and lung cancer.[91] Patient work in heart failure includes the work of developing an understanding of treatments, interacting with others to organise care, attending appointments, taking medications, enacting lifestyle measures and appraising treatments. Burden of treatment theory (BOT)[51] explains how the capacity for action interacts with the work that stems from healthcare. We are particularly interested in BOT across different situation of consultation and BOT provides the theoretical underpinning of Phase 2.

Minimally Disruptive Medicine (MDM)[52] is an approach to healthcare that seeks to reduce the workload for the patient and caregiver. MDM seeks to advance patient goals for healthcare using effective care programmes designed and implemented in a manner that minimises the negative impact the care programme imposes on their lives.[92] A 'minimally disruptive' orthopaedic rehabilitation consultation is a consultation that:

- has minimal negative imposition on the patient's life
- offers a reduce workload for the patient
- ensures healthcare professionals and care are accessible to the patient

The CONNECT Project utilises the aforementioned theories to understand:

(i) the workload of being a patient when using communication technology (using NPT);
(ii) how the situational nature of a communication technology and face-to-face consultation influence burden of treatment (using BOT) and patient preferences;
(iii) patient preference in relation face-to-face and communication technology consultations;
(iv) what a 'minimally disruptive' orthopaedic rehabilitation consultation looks like in practice (MDM).

2.3 Population

Adults ≥ 18 years of age with orthopaedic conditions.

2.4 Philosophical Underpinnings

This study is set within the abduction paradigm.[95] Abduction is the production of a hypothesis based on surprising evidence and, when following this approach, researchers seek to choose the 'best' amongst many alternatives. Abduction sits in the philosophical tradition of pragmatism, an ideology that supports the notion that a proposition is true when it works satisfactorily. Within the context of this research, one can make assumptions that 'certain' patients may prefer virtual appointments to face-to-face appointments (or vice versa).

We hypothesise that certain patients may indicate they prefer virtual appointments to face-to-face appointments (or vice versa). Large scale data collection in Phase 3 will support theorisation of preference in this study group. The purpose of the research is to develop satisfactory propositions, based on these data, to explain patient preferences and to design a minimally disruptive pathway based on these propositions.

2.5 Overall Aim

To understand the patient preferences for the use of communication technology in orthopaedic rehabilitation consultations and design a 'minimally disruptive' consultation pathway based on these preferences.

2.6 Health Condition

Patients with orthopaedic problems.

2.7 Methods & Analysis

An overview of the four Phases of the CONNECT Project is shown in
Figure 2 on page 24.

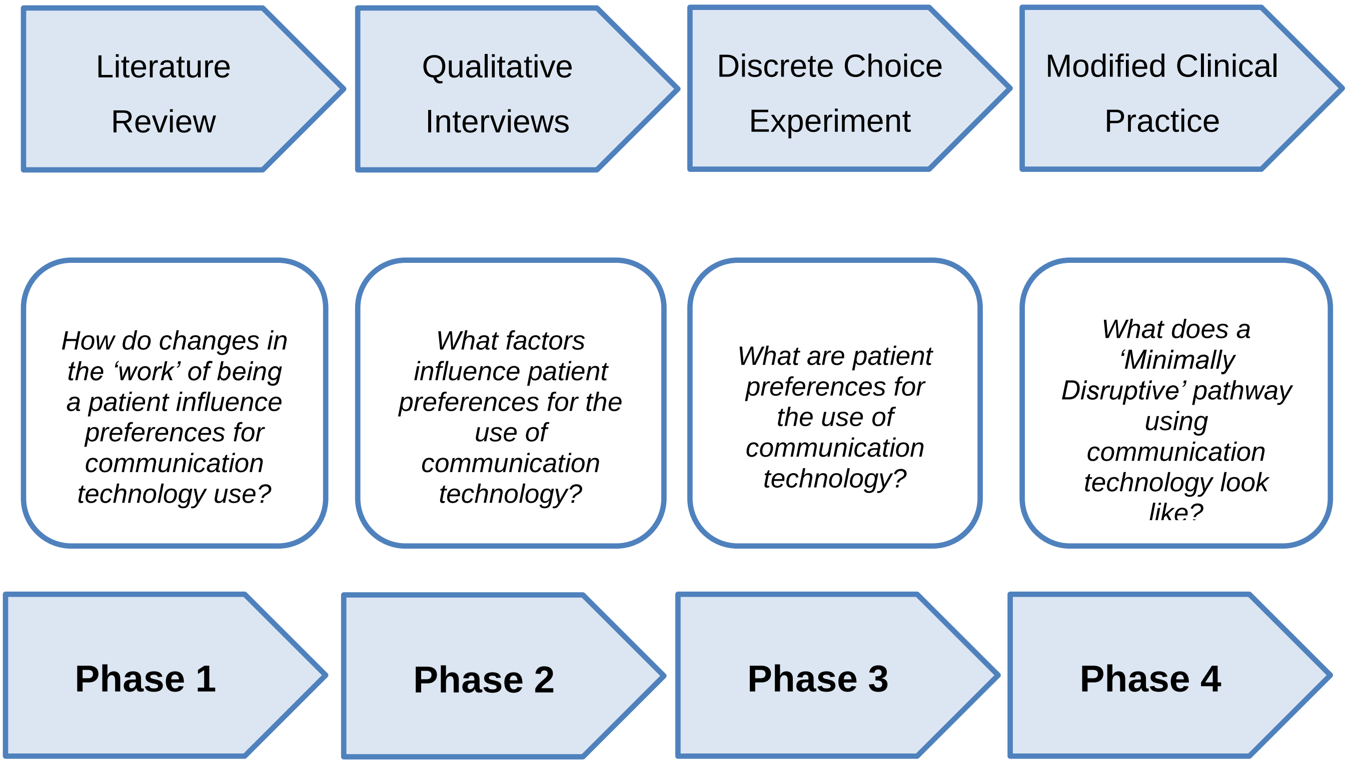

Figure 2 Overview of the four Phases of the CONNECT Project

2.7.1 Phase 1: Systematic Review

We are interested in how the 'work' of being a patient influences preference. To the authors' knowledge, no research has yet considered how the work of being a patient influences preference for communication technology consultations. The purpose of Phase 1 is to develop a taxonomy of tasks required of patients using communication technology. We will then consider how factors relating to these tasks influence the comparative evaluation patients are faced when offered the choice of a communication technology or a face-to-face consultation for orthopaedic rehabilitation. This systematic review will be conducted using the PRISMA approach in order to answer the research question: *How do changes in the 'work' of being a patient when using communication technology influence patient preferences?* The protocol for this review was registered on the International prospective register of systematic reviews (PROSPERO registration number: ID=CRD42018100896).[103] The PRISMA Protocol (Prisma P) is demonstrated in Appendix C (page 311).

MEDLINE, AMED, CINAHL, PsychINFO and SCOPUS will be searched from inception. The full search strategy, with search terms for each database, is available in Appendix D (on page 313). Following the search, articles will be screened independently by two authors to identify full text studies to be included in the review. A third author will be available to discuss any discrepancies.

Studies will be eligible for inclusion providing they meet the criteria for inclusion shown in Table 1. Relevant studies will be firstly screened by their title and then by their abstract. Remaining texts will then read in full with all texts retained after this point for qualitative synthesis. Risk of bias will be screened using the Critical Appraisal Skills Programme (CASP) tool for qualitative studies.[104] A discussion will be held between the authors to decide whether included studies are of sufficient quality to include in the review. A third author will be available to discuss any discrepancies. Reasons for exclusion will be listed.

Table 1 Eligibility Criteria of Studies for Phase 1

Inclusion:	Exclusion:
• Full text academic papers. Participants: • Patients with an orthopaedic / musculoskeletal problem Intervention: • Studies reporting patients accessing physical assessment / rehabilitation using communication technology (e.g. telephone, videoconferencing) in an orthopaedic / musculoskeletal setting. Outcome: • Qualitative studies or studies with a qualitative component that focuses on the patient viewpoint of accessing communication technology.	• Conference abstracts • Participants without an orthopaedic / musculoskeletal complaint • Quantitative studies • Studies not reporting patient viewpoints

Full texts will be uploaded to QSR NVIVO Software (QSR International Pty Ltd. Version 12, 2018). NVIVO will be used to collect and organise data from the results, discussion and conclusion sections of each paper. Data will be collected by one author (AWG). For the purpose of data collection, the introduction and methods will be disregarded. The following process will then be followed:

1. Each sentence from the results, discussion and conclusion sections from the papers will be extracted and coded in NVIVO on a line by line basis. The codes will be attributed to each sentence based on their content.

2. An Abductive Analysis[95] will then be conducted and will take three forms:
    a. Firstly, a thematic analysis of codes. This will enable authors to familiarise themselves with the content of the papers.
    b. The following will be considered: *what is the work of being a patient when using communication technology?* Codes will then be organised into groups of codes depicting the *type* of work required of patients when using communication technology to access healthcare in order to develop a taxonomy of the types of work.
    c. We will consider the question: *how might the work of being a patient when using communication technology influence patient preference?*
3. Data will be mapped out in the form of a model to demonstrate how, based on the included papers, the change in the 'work' of being a patient might influence preference for communication technology.

2.7.2 Phase 2: Qualitative Interviews

Ethical Approval received 4th December 2018 from the South Central-Oxford C Research Ethics Committee (IRAS ID: 255172, REC Reference 18/SC/0663).

The aim of Phase 2 is to explore how the use of communication technology changes the experience for patients receiving physiotherapy and occupational therapy for orthopaedic problems. This study will be conducted at one hospital. The results from Phase 1 will frame the initial enquiry and interview schedule for Phase 2. Questions relating to Burden of Treatment Theory[51] will explore the potential impact and workload changes for patients with the use of these technologies. The research question for Phase 2 is: *How does communication technology use affect patient experience?* A focus on the circumstances in which patients would prefer to use communication technology will be used to inform the design of a Discrete Choice Experiment (DCE) for Phase 3 of the CONNECT Project. These viewpoints (Phase 2) and the DCE (Phase 3) will inform the design of a modified clinical pathway (Phase 4).

This study will use qualitative methodology to gain rich data regarding patient and clinicians' opinions. Qualitative methods have been chosen to explore the underlying reasons behind these opinions. Semi structured interviews have been chosen to provide a loose guide and enable the researcher to explore pertinent themes relating to the research aims and objectives without the rigidity of a survey. The research paper reporting the results of Phase 2 will be reported using the SRQR Checklist (the checklist for this protocol paper is available in Appendix E on page 319).

The study will be conducted at one hospital site (a tertiary orthopaedic hospital). Participants will be recruited from the occupational and physiotherapy department of the hospital site. This study will aim to recruit 20 patients (5 males, 5 females under the age of 49; 5 males, 5 females aged 50 and over) and 20 clinicians comprising of physiotherapists and occupational therapists (at least 8 occupational therapists). This number has been selected to allow for a broad range of views within the scope and resources of a sub-study within a PhD project. Patients are eligible for inclusion if they meet the inclusion criteria shown in Table 2.

Table 2 Inclusion / Exclusion criteria for Phase 2

Inclusion:	Exclusion:
• Patients, over the age of 18 years, attending the hospital site for Physiotherapy or Occupational Therapy • Patients who have experience of orthopaedic / musculoskeletal condition • Patients who are able to provide informed written consent to enter into the study • Patients able to understand and speak English or a language covered by the hospitals Interpreter service	• Patients without the capacity to consent • Patients suffering from disorders other than orthopaedic as the primary cause (e.g. neurological or oncology disorders)

Participants who are eligible to enrol will be given a participant information sheet. All participants will have at least 24 hours to consider their participation and ask questions before being asked to provide informed, written consent. Upon receipt of consent the participant will be recruited into the study. All participants will receive a copy of the consent form and a copy will also be saved in the project file. The lead researcher (AWG) is a practicing physiotherapist at the hospital site. Patients will not be eligible for inclusion if they have previously, or are currently, been treated by AWG. At a mutually convenient time, the participants will be interviewed by AG, either face-to-face or via video call using Skype or Zoom software. Interviews will be conducted using an interview guide developed upon completion of Phase 1. All interviews will be audio recorded. All recordings will be linked anonymised using a unique study identifier, stored on an NHS Password encrypted computer and be sent off to an external company to be transcribed verbatim.

Upon receipt of the transcriptions, copies will be posted to all participants with an enclosed stamped addressed envelope. Participants will be given two weeks to review the transcriptions for factual accuracy and given the opportunity to add any additional comments. Transcripts will not be amended if the participant does not return them. At this stage no other input will be required from research participants.

Upon receipt of amended transcripts or confirmation that no changes are required, transcripts will be uploaded into NVIVO software for organisation of data. Each sentence from the included sections will be coded in NVIVO on a line by line basis. The codes will be labelled using a description of the content of the respective sentence. Data analysis will take three forms: firstly, a thematic analysis of codes. This will enable researchers to familiarise themselves with the content of the interviews. For the second iteration of coding the following will be considered: *what is the work of being a patient when using communication technology?* Codes will then be organised into groups of codes depicting the *type* of work required of patients when using communication technology to access healthcare in order to develop a taxonomy of the types of work. The coding will be completed in a way that looks to extend the model in Phase 1. Throughout this process, we will consider the question: *how might the work of being a patient when using communication technology influence patient preference?* Specific data to support the design and development of future components of the CONNECT Project (namely Phase 3) will be organised separately.

2.7.3 Phase 3: Discrete Choice Experiment

Ethical Approval received 18th October 2019 from the London-Hampstead Research Ethics Committee (IRAS ID: 248064, REC Reference 19/LO/1586).

The aim of Phase 3 is to understand the factors that influence patient preference when presented with the choice between a face-to-face and communication technology consultation for orthopaedic rehabilitation. The research question for Phase 3 is *what factors influence preferences for patients undergoing orthopaedic rehabilitation who are offered a face-to-face or communication technology consultation?*

The results from Phase 1 and Phase 2 will inform the design of the DCE. It is not clear at this stage what the attributes and individual levels will be. However, they are likely to include travel time and cost, perceived ease of use of equipment to engage in the consultation, raining requirements, conduct and content of the consultation and the number of engagements with clinicians during any given pathway.

A D-efficient design will be created in NGene software (Choice Metrics) where attribute non-linearity will be allowed (i.e. levels of specific attributes allowed to have non-linear effects). To reduce cognitive burden on participants the maximum number of choice sets will be limited to 12 and blocking will be utilised if required (i.e. blocking implies orthogonally splitting the number choice sets into two or more groups which are then presented to different individuals).

This study will be conducted across two hospital sites (a tertiary orthopaedic hospital and a secondary care orthopaedic hospital). Participants will be recruited from the occupational and physiotherapy department of the hospital site. This study will aim to recruit at least 200 patients per site. Patients are eligible for inclusion if they meet the inclusion criteria shown in Table 3.

Table 3 Inclusion / Exclusion criteria for Phase 3

Inclusion:	Exclusion:
• Patients, over the age of 18 years, attending either hospital site for Physiotherapy or Occupational Therapy • Patients who have experience of orthopaedic / musculoskeletal condition • Patients who are able to provide informed written consent to enter into the study • Patients able to understand and speak English or a language covered by the hospitals Interpreter service	• Patients without the capacity to consent • Patients suffering from disorders other than orthopaedic as the primary cause (e.g. neurological or oncology disorders)

It is anticipated that around 200 participants per site will be recruited but precise numbers will be dependent on a power analysis once the number of questions and blocks has been ascertained. Participants who are eligible to enrol will be given a participant information sheet. All participants will be asked to provide informed, written consent at that time. Upon receipt of consent the participant will be recruited into the study. All participants will receive a copy of the consent form and a copy will also be saved in the project file.

The DCE questionnaire will be designed using online questionnaire software (Survey Monkey). The DCE will be administered in the choice of 2 forms - paper or electronically using a tablet computer

– and patients will be offered the choice of completing at the study site or at home within 24 hours. All participants will be provided with an envelope to return the completed DCE questionnaire. Data from paper questionnaires will be manually entered by the researcher. Online SurveyMonkey questionnaires automatically exports data into Microsoft Excel. The initial questionnaire will be piloted with approximately 10 patients. This will undergo repeat piloting on further iterations of the DCE until the final design is established.

Initial reporting will provide descriptive data for demographic variables and observed choices (virtual vs face-to-face) by choice set. Given the binary set-up of the experiment, analysis will proceed with conditional logit and random parameter binary models.[105] Attribute levels will enter as covariates to explain individual choices, while individual specific characteristics will either enter as interactions with attribute or directly, depending on the estimation model used. Following standard literature, unobserved heterogeneity, if present, will be explored through a random coefficient model. Trade-offs and marginal rates of substitution between attribute level will be calculated, while willingness-to-pay values will also be computed if cost is present in the final list of attributes for the experiment. The resulting factors that influence preferences will be used to further develop the model of patient preference from Phases 1 & 2.

2.7.4 Phase 4: Pathway Design

The aim of Phase 4 is to design a model of care based on the results from Phase 1-3. The research question for this Phase is *what does a minimally disruptive consultation look like in orthopaedic rehabilitation?* A theoretical model of care developed during the results of Phases 1-3 will be applied practically to orthopaedic rehabilitation. The model of rehabilitation will be designed and piloted with a small number of patients (approximately 10) and their clinicians to understand the impact of the new consultation format. A small study of acceptability will be conducted with a view to inform the further development of the model of care and to gain insight into the issues that might influence further upscale and transportability of the model of care in other settings. Ethical and Health Research Authority approval will be sought prior to commencing this Phase.

2.7.5 Potential benefits to patients and to the NHS

Previous studies into the introduction of e-health technologies have used top down models in which the methodologies and interventions have been decided by investigators without a complete understanding of patient preferences. These studies, although pointing to the value of e-health technologies, have not always led to routine uptake in clinical practice. The CONNECT Project investigates the role of patient preferences in normalisation processes, and it is postulated that the knowledge of such patient preferences is more likely to lead to successful e-health implementation. This project will focus on orthopaedic rehabilitation appointments, but it will have much wider implications for the introduction of e-health technology to other spheres of medicine. There is the potential to both provide a better patient service and to effect cost savings to society and the healthcare system.

2.7.6 Patient and Public Involvement

The CONNECT Project Patient and Public Involvement steering group (PPISG) has been set up to provide guidance on the conduct of the research (details available from www.theconnectproject.info). The first meeting of the PPISG was held in August 2016 prior to the submission of the research to the NIHR in May 2017. A discussion was held about the overall research aims which supported the identification of the research questions. The PPISG has supported the design of the overall research plan and will continue to be involved during the development and refinement of each Phase prior to the completion of each study protocol. The participant information and consent forms and the discrete choice experiment questionnaire for Phase 3 has been reviewed by the PPISG. In addition, the PPISG will support the development of the lay-summary outputs to be disseminated to patients and members of the public.

2.7.7 Ethics and Dissemination

The design of a pathway and underpinning patient preference will assist in understanding factors which might influence technology implementation for clinical care. This study requires ethical approval for Phases 2, 3 and 4. Approvals have been received for Phase 2 (Approval received 4th December 2018 from the South Central-Oxford C Research Ethics Committee [IRAS ID: 255172, REC Reference 18/SC/0663) and 3 (Approval received 18th October 2019 from the London-Hampstead Research Ethics Committee [IRAS ID: 248064, REC Reference 19/LO/1586]) and will be sought for Phase 4. All participants will provide informed written consent prior to being enrolled onto the study.

A manuscript will be written for publication for each Phase and submitted to National and International Conferences. In addition, lay summary results will be developed and made available for patients and members of the public. All results will be published in open access peer reviewed journals. Links to research outputs will be made available on the CONNECT Project website available at www.theconnectproject.info.

2.7.8 Acknowledgements

The authors thank members of the CONNECT Project patient and public involvement steering group for their invaluable contributions to the study design. The authors also thank Rachel Dalton, John Doyle, Anju Jaggi, Iva Hauptmannova, Rosalind Moss, John Skinner and colleagues within the Therapies Directorate and Research and Innovation Centre at the Royal National Orthopaedic Hospital for their ongoing support.

2.7.9 Contributors

AWG wrote the paper and conceived the project with the support of CRM, JJ and MS. CRM contributed knowledge on systematic reviews and qualitative research. JJ and EM contributed knowledge on the DCE. CRM, JJ, MS and EM edited and critically revised the paper. All authors have read and approved the manuscript. AG is the guarantor of the manuscript.

Chapter 3 The use of virtual consultations in an orthopaedic setting: How do changes in the work of being a patient influence patient preferences? A systematic review and qualitative synthesis

This paper has been published in BMJ Open and is included as a ‘published version’. The full reference of the paper is: Gilbert AW, Jones J, Jaggi A, May CR. Use of virtual consultations in an orthopaedic rehabilitation setting: how do changes in the work of being a patient influence patient preferences? A systematic review and qualitative synthesis. BMJ open. 2020 Sep 1;10(9):e036197. The formatting, spelling, and referencing for this paper are presented according to the journal’s style requirements. In line with the Creative Commons license under which this paper was published, and the publisher’s rights and permissions for open access publications, no additional permissions are required to include this article in this thesis as long as the appropriate citation is made.

3.1 Abstract

Objectives

To systematically review qualitative studies reporting the use of virtual consultations within an orthopaedic rehabilitation setting and to understand how it’s use changes the work required of patients.

Methods

Following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Statement we conducted a systematic review of papers to answer the research question ‘How do changes in the work of being a patient when using communication technology influence patient preferences?’ Electronic databases were searched for studies meeting the inclusion criteria in April 2020.

Results

The search strategy identified 2057 research articles from the database search. A review of titles and abstracts using the inclusion criteria yielded 21 articles for full text review. Nine studies were

included in the final analysis. Six studies explored real time videoconferencing and three explored telephone consultations. The use of communication technology changes the work required of patients. Such changes will impact on expectations for care, resources required of patients, the environment of receiving care and patient-clinician interactions. This adjustment of the work required of patients who access orthopaedic rehabilitation using communication technology will impact on their experience of receiving care. It is proposed that changes in the work of being a patient will influence preferences for or against the use of communication technology consultations for orthopaedic rehabilitation.

Conclusion

We found that the use of communication technology changes the work of being a patient. The change in work required of patients can be both burdensome (it makes it harder for patients to access their care) and beneficial (it makes it easier for patients to access their care). This change will likely to influence preferences. Keeping the concept of patient work at the heart of pathway redesign is likely to be a key consideration to ensure successful implementation.

Registration

PROSPERO registration number: ID=CRD42018100896.

Strength and limitations of this study

- A taxonomy of patient work will assist in understanding implementation processes.
- The use of middle range theory has been employed to guide theorisation of these data.
- A secondary analysis of data has been employed to explain concepts which the authors had not originally intended.
- The date range of included studies (2005-2019) include a range of technologies including the use of bespoke software which may present different challenges to modern off the shelf software.

3.2 Introduction

3.2.1 Background

The NHS Long Term Plan,[4] The United Kingdom's health service's plan to 'make the NHS fit for the future of patients', advocates digital-first primary care and envisions the use of e-consultations to become a new option for every patient. Virtual consultations can support the management of patients with long term conditions such as musculoskeletal disease[6] where long term management may require repeat visits for appointments with healthcare practitioners.

There are examples of virtual consultations in practice. The PhysioDirect telephone and advice service[102] is an example that was found to be safe and resulted in equivalent outcomes to face-to-face appointments for patients with musculoskeletal disorders. The visual component offered with videoconferencing software offers distinct advantages over telephone consultations.[106] Research has been conducted investigating patients using Skype, a free to access videoconferencing software, to access care.[16] Patients who received telerehabilitation for knee arthritis via SKYPE[107] found it to be feasible and acceptable. The Virtual Online Consultations-Advantages and Limitations (VOCAL) study[108] found video outpatient consultations to be safe, effective and convenient in appropriate situations.

The process of implementing a new intervention (such as the introduction of virtual consultations in healthcare) has been demonstrated to be dependent on how the intervention is operationalised by its users,[67] the work people do when they implement a new intervention[68] and the mobilisation of resources over time[69] across different settings.[70] Normalisation Process Theory (NPT) frames implementation processes through its focus on the things people *do* when they implement a new intervention in practice. One study investigated nurse call takers conducting a physical assessment of patients' over a telephone helpline.[109] The study reported nurses' interactions with patients as they instructed them over the phone to perform physical manipulations. The accomplishment of a physical examination required work from patients that differs to face-to-face consultations. Burden of treatment theory[51] explains how the capacity for action interacts with the work that stems from healthcare. Burden of treatment has been demonstrated to arise when the workload demands exceeds the capacity for patients with COPD and lung cancer.[91] An understanding of the factors that contribute to a change in the work for patients using virtual consultations is an important consideration for patient experience.

Research conducted in the UK found that the majority of people say they would use video consultations to consult their General Practitioner about minor ailments and ongoing condition[110]. A proportion (approximately 35%) would not use this modality. Our previous research investigated whether patients preferred face-to-face or virtual consultations[49]: patients with atraumatic shoulder instability were offered the choice between SKYPE and face-to-face follow up rehabilitation appointments. Half of patients preferred to see their rehabilitation professional in person[49] in part due to not having access and knowing how to use the software and equipment. The use of SKYPE changed what patients needed to do to engage in their care in our small study and this influenced their choice on whether or not to use it.

Preferences are a set of complex factors that may include enjoyment comparisons *(x to y is preferred if someone enjoys x more than they enjoy y)*, comparative evaluations *(x to y is preferred if someone thinks x is better than y)*, favouring *(selecting x over y because x has a particular set of characteristics)* or choice ranking *(x is chosen over y if and only if they are faced with a choice of x over y).*[5] To get past the complexities of preferences, preferences can be defined as a 'total subjective comparative evaluation'.[53] In essence, someone will prefer x over y after consideration of the alternatives, the actions, the state of affairs and the consequences of choosing each alternative. In this paper we are interested in understanding how patient work influences patient preferences.

3.2.2 Aims of this review

This paper reviews qualitative literature on the use of communication technology for patients in an orthopaedic rehabilitation setting to understand how the work of being a patient influences preference. The purpose of this paper is to develop a taxonomy of tasks required of patients using communication technology. We then consider how factors relating to these tasks influence the comparative evaluation patients face when offered the choice of a communication technology or a face-to-face consultation for orthopaedic rehabilitation.

3.3 Methods

A systematic review was conducted using the PRISMA approach in order to answer the research question: *How do changes in the work of being a patient when using virtual consultations influence patient preferences?* This review was registered on the International prospective register of systematic reviews (PROSPERO registration number: ID=CRD42018100896).[103] The protocol for the CONNECT Project has previously been published.[97]

MEDLINE, AMED, CINAHL, PsychINFO and SCOPUS were searched from inception on the 4th April 2020. Full search terms and the search strategy is available to view in Appendix D on page 313. Articles were screened independently by two authors (AWG and AJ) with a third author (JJ) available to discuss any discrepancies.

Studies were eligible for inclusion providing they met the criteria for inclusion shown in Table 1. Relevant studies were firstly screened by their title and then by their abstract. Remaining texts were then read in full with all texts retained after this point for qualitative synthesis. Risk of bias was screened using the CASP tool for qualitative studies.[104] A discussion was held, between two authors (AWG and AJ) with a third author (JJ) available to discuss any discrepancies, to decide whether included studies were of sufficient quality to include in the review.

Full texts were uploaded to QSR NVIVO Software (QSR International Pty Ltd. Version 12, 2018). NVIVO was used to collect and organise data from the results, discussion and conclusion sections of each paper. Each sentence from the included sections were coded on a line by line basis. The codes were labelled using a description of the content of the respective sentence. Data analysis subsequently took three forms: firstly, two authors (AWG and CM) conducted a thematic analysis of codes. This was undertaken to familiarise the authors with the content of the papers. For the second iteration of coding the following was considered: *what is the work of being a patient when using virtual consultations?* Codes were then organised into groups depicting the *type* of work required of patients when using virtual consultations to access healthcare. The two authors (AG and CM) then considered the question: *how might the work of being a patient when using virtual consultations influence patient preference?* The data were revisited and theoretical ideas arising from the data were discussed between AWG & CM. From here themes, empirical regularities in the data, were identified and characterised. Finally, themes arising from the data were mapped out in the form of a model to demonstrate how, based on the included papers, the change in the work of being a patient might influence preference for virtual consultations.

3.4 Results

3.4.1 Study Selection

Systematic search identified 1,655 references (after de-duplication) of which 1,634 were excluded on the basis of titles and abstracts and a further 12 excluded at full text review. As a result 9 papers were included in the review. Of the eight papers, two originated from Australia,[27,107] 2 from Canada[111,112] and 3 two from England[20,49,113] and with one from Sweden[114] and one from the Netherlands.[115] Six studies explored real time videoconferencing[49,107,111-115] and three explored telephone consultations.[20,27,112] Study demographics are shown in Table 4. All studies were screened using the CASP tool for qualitative studies[27] and all were deemed by the authors to be of sufficient quality and therefore retained for analysis. The PRISMA Flow Diagram can be seen in Figure 3.

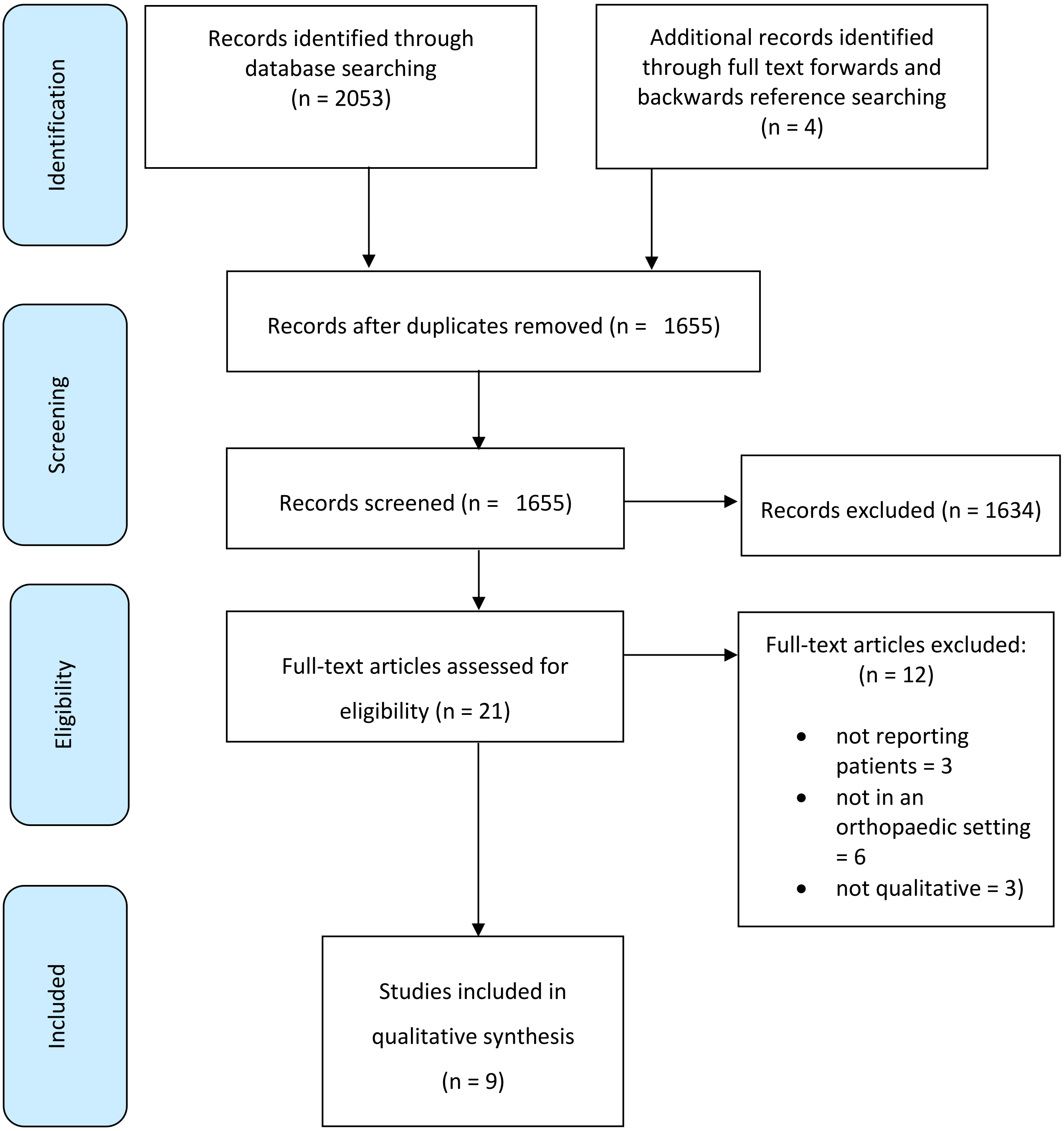

Figure 3 PRISMA Flow Diagram of included and excluded studies

Table 4 Study Characteristics

Included Study	Study Setting	Study Purpose	Technology Used	Participants
Harrison et al 2006[113]	Joint teleconsultations between the patient and their GP and a hospital specialist (England).	To explore patients' experiences of joint teleconferenced consultations.	ISDN2 link and off-the-shelf videoconferencing software.	28 patients who were enrolled in the Virtual Outreach Randomised Trial[15]. Six patients had a generic orthopaedic diagnosis.
Young et al 2007[112]	Telephone and videophone follow up after scoliosis surgery (Canada).	To better understand the relative effectiveness of two types of telehealth technology, telephone versus videophone, following a child's scoliosis surgery from the perspective of patients and care-givers.	For the videophone group patients were provided with a videophone (KXC-AP150, Panasonic, Japan). For the telephone group patients used an ordinary telephone line.	43 patients and their families (dyads) who had undergone scoliosis correction surgery. 21 dyads received videophone support and 22 dyads who received telephone support.

Eriksson et al 2011[114]	Video-based physiotherapy at the patient's home for two months after a shoulder replacement (Sweden).	To describe patients' experiences of physiotherapy at home by video-link after a shoulder replacement.	Standard commercial videoconferencing units (e.g. Tandberg 800, Sony PCS-50, Polycom VSX 3000).	10 Adults who had undergone a shoulder replacement.
Cranen et al 2011[115]	Telerehabilitation services at a rehabilitation centre (Netherlands).	To explore patients perceptions regarding prospective rehabilitation services and the factors that facilitate or impede patients' intentions to use these services.	Home based treatment by means of (unspecified) web cam treatments.	25 chronic pain patients from a rehabilitation centre.
Kairy et al 2013[111]	Telerehabilitation between the patient at home and the physical therapist at the hospital (Canada).	To better understand the patient's experience of home telerehabilitation.	Internet access and the telerehabilitation platform was installed in the patient's home as reported in[29]. The telerehabilitation device was custom built for the study.	5 patients who had previously received in-home telerehabilitation post knee arthroplasty. Patients were selected from a pool of participants from the

				experimental arm of a RCT for in-home telerehabilitation[116].
Pearson et al 2016[20]	Telephone based physiotherapy between a patient and a senior physiotherapist (England).	To describe key variables that determined patient acceptability of the PhysioDirect service and to understand how the patient experience differed from those accessing usual physiotherapy care.	Telephone.	57 patients with a musculoskeletal problem. Participants were recruited from the PhysioDirect study[102].
Hinman et al 2017[107]	SKYPE mediated physiotherapy consultations between the patient at home and the physiotherapist (Australia).	To explore the experience of patients and physical therapists with Skype for exercise management of knee osteoarthritis (OA).	SKYPE software.	12 patients with a diagnosis of knee osteoarthritis. Participants were key informants from an RCT[117].

Lawford et al 2018[27]	Exercise therapy for people with knee arthritis via telephone (Australia).	To explore people's perceptions of exercise therapy delivered by physiotherapists via telephone.	Telephone.	20 patients with knee osteoarthritis. Participants with knee OA were recruited as key informants from an RCT[118].
Gilbert et al 2019[49]	Follow up consultations for patients after a period of inpatient rehabilitation for atraumatic shoulder instability.	To explore reasons behind acceptability of SKYPE follow up consultations.	SKYPE software.	7 patients chose a SKYPE consultation, 6 patients chose a face-to-face consultation. In addition, 8 clinicians were interviewed.

3.4.2 Worked Example of Data Analysis

Data from the nine studies were synthesised. All data were treated to the same three step process. An exemplar is demonstrated below using data from Eriksson et al[114]:

1. Data identified (initial line by line identification)

Inability to touch the patient meant therapists were forced to rely more on their subjective assessment of the patient, leading them to spend more time talking with and listening to patients.

2. Data characterised (initial line by line coding)

Code assigned: *Therapists were unable to use 'hands on' during assessment.*

3. Data theorised (consideration of the question: *what is the work of being a patient when using virtual consultations?*)

Patients have to present themselves in a different way during assessment via VC.

Data from the papers are presented in Table 5 on page 45.

Table 5 Factors that may affect patient preference for virtual consultations and considerations for virtual consultations

Finding	**Construct**	**Results from included papers: factors that contribute towards the work of being a patient when using communication technology**	**Considerations for virtual consultations**
Preferences are shaped by the requirements of the consultation how these change the work	The processes that change	Patients were able to engage in consultation from different places[107]. Using virtual consultations required patients to arrange for additional equipment in the home[111]. They were required to log in to an account[115] and to learn how to use the communication technology[107].	• Consider the impact of changing processes on patients. • Offer troubleshooting for logging in and how to use the equipment. • Consider offering guidance surrounding the suitability of different locations when engaging in virtual consultations.
	The skills & expertise that is required	As patients moved away from physically facilitated exercises there was the requirement to adjust[114], overcome patient-clinician communication difficulties over video-call[112,113] and phone call[20] and face an increased reliance	• Brief and support patients on the changes in style of communication. • Facilitate patients to communicate their problems through a virtual consultation.

		on them to communicate information[107]. In the absence of hands on treatment more emphasis is placed on patients completing exercises[107]. Patients need to self-assess when they cannot be physically assessed by a therapist[107]. Patients may need to adapt to clinicians who do not have adequate communication skills or training for using virtual consultations[27]. Patients may be encouraged to self-monitor improvements more than if they were seen face-to-face[20].	• Facilitate self-assessment of patients in the absence of clinician's 'hands-on' care. • Facilitate and provide guidance on self-assessment and ongoing monitoring. • Design personalised exercise regimens that are suitable for the patient's clinical problem and their home environment
Preferences are shaped by the resources that are required of patients	Logistics	Use of virtual consultations helps to avoid of transportation issues[27,49,107,111,114,115], reduces travel times[115] for both patients and carers and can increase access to services[107].	• Consider offering virtual consultations for patients who experience difficulty with travel
	Time	The ease in which exercises can be integrated into home routine[49,115] and through avoidance of travel provides additional time and energy for	• Consider conflicting demands for patients. • Consider the impact of travel and time on patient symptoms.

		other activities[114]. Patients valued being able to wait for their appointment in their own chosen environment rather than in the clinic[20,107,113].	• Consider the impact of patient comfort when waiting for their appointment.
Preferences are shaped by the work required due to the changes in the environment	Setting for physical rehabilitation	Patients had to find ways to overcome a lack of space[107,115] and equipment[107,111] at home. Patients were required to integrate their rehabilitation in the home environment[27,107].	• Support patients to establish a suitable rehabilitation environment at home. • Design treatment regimens based on the patients access to rehabilitation equipment. • Support patients to integrate rehabilitation within the home environment.
	Setting for virtual consultation	At times the rehab was impaired due to technical difficulties[107] and patients felt they missed learning through fellow sufferer contact through not attending the clinic and would need to seek this elsewhere[115].	• Offer troubleshooting when faced with technical difficulties • Consider offering peer support groups for patients who are unable to physically attend the clinic.

	Hardware and software	Patients needed to be supported to access[107,111] and use the equipment[49,107,112,115] and manage to real-time troubleshoot connection problems as they arose[107,112,114 111].	• Consider offering equipment based on the patient's needs. • Tailor support for equipment use based on patient's skill set. • Offer troubleshooting when faced with technical difficulties.
Preferences are shaped by the work that goes into maintaining adequate interactions	Interactions	Patients may have to focus additional attention when communicating over a stutter connection[107,114] or when faced with a language barrier[112]. Patients may need to rely on additional non-verbal communication when communicating over a screen[113]. Patients who feel alienated[115] or detached[20,115] or expect hands on care[20,107,112] may need to invest additional effort in developing an effective therapeutic the patient clinician relationship.	• Clearly communicate when the connection is impaired; be prepared to abandon and reboot the virtual consultation as required. • Be prepared to emphasise the use of non-verbal communication. • Have an awareness of patient preferences; patients who prefer face-to-face care may require additional input to develop a therapeutic relationship.

3.4.3 Synthesis of Results

3.4.3.1 Theme 1: Requirements of rehabilitation

3.4.3.1.1 The processes that change

The use of virtual consultations within the treatment pathway required additional steps for patients, such as logging in[115] and setting the software up.[107] Some patients valued the portability of using Skype[107] and found that they could use it across different settings[49] to fulfil the purposes of the consultation. Patients valued the opportunity to run through the processes of using SKYPE for the first time in the form of a 'dummy run'.[49]

3.4.3.1.2 The skills & expertise that is required

The use of virtual consultations changed the skills patients needed. Video communication required specific communication skills that included listening with close attention with no interruptions.[114] The gaze of the patients and clinicians were used to signal the start and end of conversations.[114] Patients and their families found it challenging to express how they felt from a distance and were reliant on the visual capabilities of the technology.[112] The lack of visual information was a concern for patients in the PhysioDirect service[20] who did not have visual cues and physical contact. The lack of physical contact meant that therapists were more reliant on information shared by patients rather than those derived from physical tasks.[107] Therapist focussed on more effortful treatments such as exercises and self-management rather than providing them with hands on care.[107] Traditional face-to-face interaction is well established and accepted. It was recognised that virtual communication required different skills and therapists' training needs, to ensure effective communication with patients, were considered in one study of telephone consultations.[27] Traditional physiotherapy patient assessment (such as 'hands on' palpation of a joint) is not possible via Skype. As a result of this patients were taught to self-palpate under guidance[107] and instructed how to demonstrate their range of movement over the screen. It is self-evident that visual assessment was not possible over telephone[20,27,112] and this required good communication from both therapists and patients to describe the movements. Patients felt they did not need 'hands on' care when they were seen by an experienced therapist[114] and clinicians were more likely to encourage self-management and exercises when they were seen virtually.[20]

3.4.3.2 Theme 2: Resources

3.4.3.2.1 Logistics

Patients who underwent virtual consultations experienced reduced travel times and transportation issues[27,107,111,114,115] and was often seen as more convenient for patients, particularly those who suffered from chronic pain.[107] Virtual consultations enabled patients to access health services more easily.[111,113] Problems did arise with the PhysioDirect service where patients were unable to get through requiring them having to make multiple calls to speak to a therapist.

3.4.3.2.2 Time

Virtual consultations offered flexibility[27]: *'If I know I'm stuck at work and I can't get to see someone [the telephone] would be a good option…I can ring someone or have an appointment on the phone, and be at work doing what I need to do, and still have my appointment.'* It was particularly useful for patients who had multiple commitments: *'Because life's so busy in general too, so to be able to speak to somebody in your home and then you can go on with your, you know, your next thing, is just wonderful…it just opens another brilliant option for people'* as it provided more time for other activities and to integrate rehabilitation into daily life.[114]

3.4.3.3 Theme 3: Environment

3.4.3.3.1 Setting for rehabilitation

Rehabilitation in the home was welcomed by some patients as it gave them the opportunity to rehab within their own environment whereas other patients preferred to keep their home environment separate from the clinical environment.[115] Patients found that they had a lack of space at home compared to the clinic[107,115] and could not access clinic-based equipment.[107,111] Rehabilitation required patients to troubleshoot ways to integrate their rehabilitation tasks within the home.[27,107]

3.4.3.3.2 Setting for virtual consultation

Some patients valued fellow sufferer contact and felt that through not physically attending the clinic they missed out on stimuli which kept them motivated. Rehabilitation was impaired when there were issues with connectivity and audio-visual interference disrupted the flow of the consultation.[107] Some patients felt that telerehabilitation was as good as real life and didn’t affect the flow of the consultation.[114]

3.4.3.3.3 Hardware and Software

Patients who did not have access to equipment for virtual consultation needed to be provided with the required hardware.[111,112,114] In some cases, significant support was required for patients to understand how to use the equipment[115,107,112] and to troubleshoot connection problems when they arose.[107,111,112,114] Overcoming these barriers was an important factor in maintaining the quality of the virtual consultation and is likely to require technical support provided by the clinical team.[107]

3.4.3.4 Theme 4: Interactions

Some patients reported being more relaxed in their own home.[107] One patient, however, felt uncertain about having someone looking into their home and aborted the video consultation.[114] Virtual interactions were impaired at times there was a poor connection[107,114] or a language barrier.[112] These situations demanded additional focus and non-verbal communication[113] from the patient. The therapeutic relationship between patients and clinicians is negatively affected when patients feel alienated[115] or detached[20,115] from their clinician. Patients with an expectation of hands on care[20,49,107,112] found virtual rehabilitation more challenging and may need to invest additional effort to maintain an effective relationship with their therapist.

3.5 Discussion

This review synthesised nine qualitative studies reporting the use of virtual consultations in an orthopedic setting. We explored how the use of these technologies impacts on the work of being a patient. All studies in this review demonstrated that adjustments are required of patients to operationalise communication technology for virtually mediated clinical interactions. The adjustments (in the work) that a patient needs to make will have an effect on their experiences of receiving care. These experiences, whether previously lived or anticipated in the future, are likely to influence whether or not an individual finds the use of virtual consultations acceptable. The patient preference for a virtual consultation will depend on individual circumstances. Some of these factors which might influence their decision have been and presented in a conceptual model. The model attempts to demonstrate the relationship between patient work and preference when using communication technology. The model suggests that the use of virtual consultations changes the work of being a patient. The consequences (both positive and negative) of these alterations in work may impact on the patient’s experience of receiving their healthcare, their burden of treatment and their ability to engage with their healthcare. This is an important consideration for clinician, managers and policy makers.

Clinicians have to pay more attention to the patient as a result of communicating using technology compared to face-to-face consultations[9]. This appeared to be at odds with traditional consultations where physiotherapists spoke for half of the allotted time compared to patients who spoke for only 33.1%[119] in initial encounters. A study found, during a follow up session between physiotherapists and patients, that physiotherapists spent twice as much time talking as the patients did and they relied on the use of their hands during the session.[120] In addition to the content within sessions, the relationship experienced between the clinician and the patient may differ during a virtual consultation due some patients being more relaxed at home.[9]

Some patients expected ‘hands-on’ treatment. The transfer of clinician manual therapy towards patient self-palpation[107] and exercise[20] may go against what is expected of therapists. The normative expectations of the patients change as a result of the geographical separation (and physical resources that can be mobilised) between patient and therapist.[121] This places particular emphasis on self-management which shifts the responsibility for health away from the state and onto the individual.[122] This is an important consideration as virtual consultations becomes increasingly used in clinical practice. The additional responsibility of self-management,[123] the change in work and tasks required to operationalise communication technology may further burden patients as they are rehabilitated virtually.

Patient viewpoints are important. Kaambwa et al[124] found in their study of older people that patients had strong preference for telehealth services that targeted individuals living in remote regions without easy access to clinic. Our previous research[49] demonstrated that distance to travel to a hospital was not the sole reason leading to the acceptability of Skype consultations and that preference is multi-factorial. We found that having rehabilitation in the patient’s own environment was preferred by some although bringing the clinical space into the patient’s home can change the meaning of their home for them.[125] Greenhalgh et al[126] considers, amongst other things, *what is expected* of the patient when using new technologies and explains that complex tasks are more likely to lead to non-adoption.

Greenhalgh et al’s VOCAL study[127] found that the situations where patients were appropriate for video outpatient consultations only formed a fraction of the overall workload. Such situations included when close physical examination was not required and when both parties were technically confident and competent. The use of virtual consultations in these situations may increase patient work and therefore contribute towards their burden of treatment. Patients may therefore opt to choose a face-to-face consultation. Sav et al[128] call for collaborative discussions to help alleviate treatment burden.

Digitally enabled services are a key focus for the UK's National Health Service over the next 10 years.[4] The use of digitally enabled services such as virtual consultations may be useful for some but add to the burden of treatment to others. Tools have been developed to assess burden of treatment.[129-133] Further research investigating the utility of tools such as these may highlight areas where digitally enabled services negatively (or positively) impact on patient experience. The work required and subsequent treatment burden for patients will differ on an individual case by case basis. Table 6 on page 54 outlines some considerations for clinicians and policymakers considering the use of virtual consultations based on our findings from this systematic review. Further research investigating patient preference will help researchers and clinicians tailor services in a way that suits the need of patients.

Table 6 References for Policy Makers

Finding	Construct	Considerations for virtual consultations
Preferences are shaped by the requirements of the consultation how these change the work	The processes that change	• Consider the impact of changing processes on patients. • Offer troubleshooting for logging in and how to use the equipment. • Consider offering guidance surrounding the suitability of different locations when engaging in virtual consultations.
	The skills & expertise that is required	• Brief and support patients on the changes in style of communication. • Facilitate patients to communicate their problems through a virtual consultation. • Facilitate self-assessment of patients in the absence of clinician's 'hands-on' care. • Facilitate and provide guidance on self-assessment and ongoing monitoring. • Design personalised exercise regimens that are suitable for the patient's clinical problem and their home environment
Preferences are shaped by the resources that are required of patients	Logistics	• Consider offering virtual consultations for patients who experience difficulty with travel
	Time	• Consider conflicting demands for patients. • Consider the impact of travel and time on patient symptoms.

		• Consider the impact of patient comfort when waiting for their appointment.
Preferences are shaped by the work required due to the changes in the environment	Setting for physical rehabilitation	• Support patients to establish a suitable rehabilitation environment at home. • Design treatment regimens based on the patients access to rehabilitation equipment. • Support patients to integrate rehabilitation within the home environment.
	Setting for virtual consultation	• Offer troubleshooting when faced with technical difficulties • Consider offering peer support groups for patients who are unable to physically attend the clinic.
	Hardware and software	• Consider offering equipment based on the patient's needs. • Tailor support for equipment use based on patient's skill set. • Offer troubleshooting when faced with technical difficulties.
Preferences are shaped by the work that goes into maintaining adequate interactions	Interactions	• Clearly communicate when the connection is impaired; be prepared to abandon and reboot the virtual consultation as required. • Be prepared to emphasise the use of non-verbal communication. • Have an awareness of patient preferences; patients who prefer face-to-face care may require additional input to develop a therapeutic relationship.

Figure 4 on page 57 demonstrates how the themes from this review interact with patient preferences. The work required of a patient will influence their expectations of whether or not the use of virtual consultations is acceptable. The logistics and time required of a patient will shape the resources the patient has to dedicate towards their care. The space available and the equipment the patient has access to determines the suitability of the environment. These, coupled with the impact on patient-clinician interactions will determine patient preference for or against virtual consultations. This leads us to our first preposition: Proposition 1: The work required of patients when using virtual consultations will influence their preferences for their use.

Face-to-face consultations and communication technology consultations have different requirements. Upon choosing a face-to-face consultation the patient follows the standard pathway. Choosing a communication technology consultation changes what is needed of patients. The change of work demands different skills, processes, expertise, logistical and environmental considerations. This in turn impacts on the nature of the interactions between the patient and their therapist. This leads us to our second preposition: Proposition 2: The preferences regarding the use of virtual consultations will influence the work of being a patient.

The outbreak of 2019 novel coronavirus (COVID 19) was first reported in Wuhan, China and reached the United Kingdom on the 31st January 2020. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Social distancing measures have been established with the UK public being placed on 'lockdown' from the 23rd March 2020[134] to avoid transmission of the disease. Healthcare organisations have subsequently embraced the use of virtual consultations to comply with these social distancing measures.[31] The outbreak of COVID-19 has led to a huge upsurge in the interest and importance of virtual consultations in practice.[31,135,136] As such, many more patients have been forced into undergoing virtual consultations than would have otherwise been required. NHSx recently published information governance advice for health and care professionals[30] to facilitate appropriate use of virtual consultations during COVID-19. Future research should carefully evaluate the consequences of rapid virtual consultation implementation to allow for appropriate redesign of services embracing communication technology. Such redesign should consider how the use of these technologies impact on the work of being a patient.

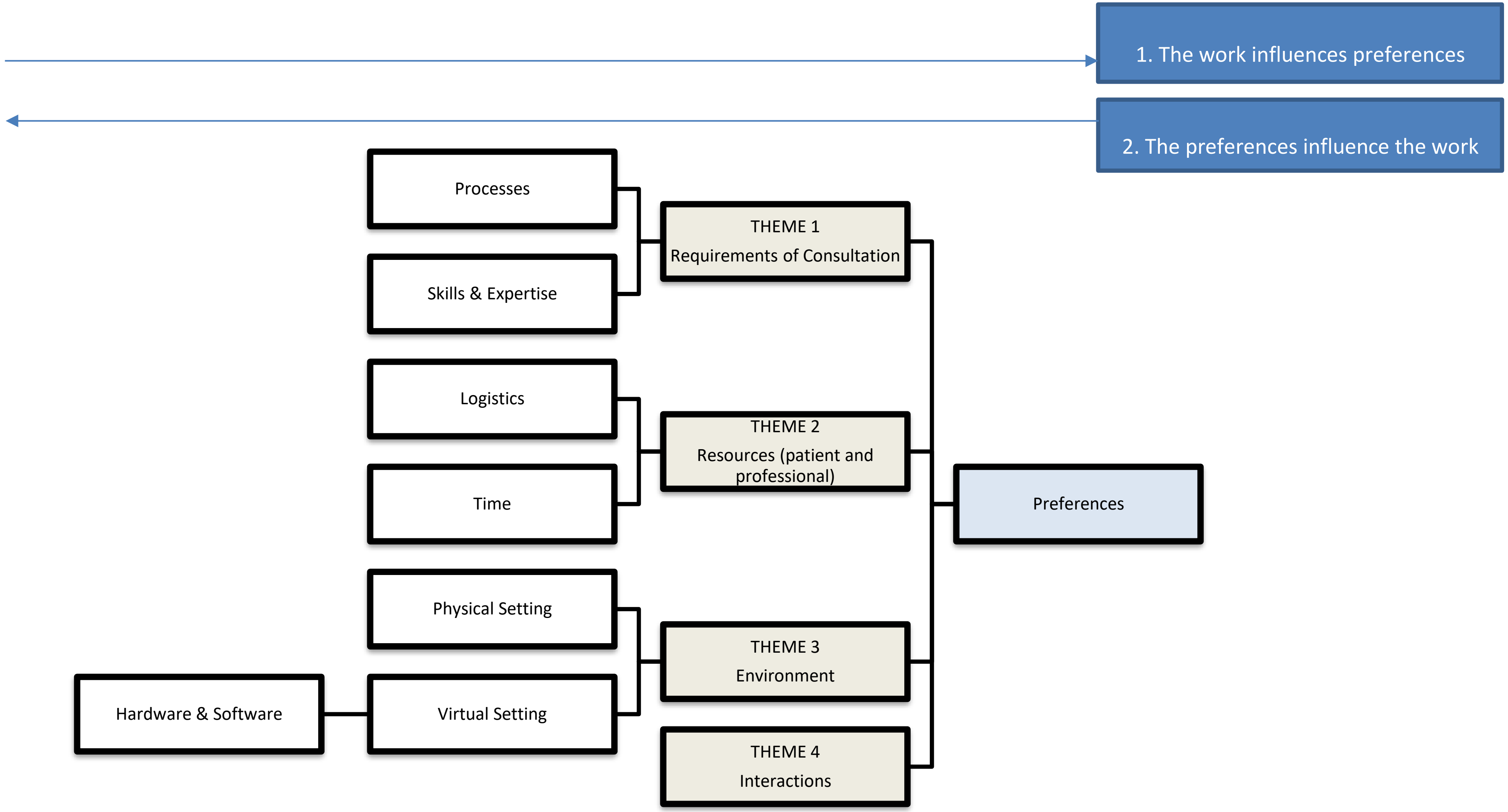

Figure 4 Visual Model to demonstrate how work influences preference

3.5.1 Limitations of this review

Our review is subject to a number of important limitations. We included papers from the UK, Sweden, USA, Canada, the Netherlands and Australia which utilised a variety of communication technologies. The data that underpins our results are a secondary analysis of other previously collected data. We did not have access to the original qualitative datasets, only that presented in the research papers. To arrive at our conclusions, we have subjected the data from the primary studies to explanatory concepts that the original authors had not intended. The studies spread from 2005 to 2019. During this time technology has advanced considerably and the bespoke software used in the earlier studies (that were developed for the research study) may present different challenges to modern off the shelf software for use with commonly used personal devices such as phones, tablets or computers. It is also important to acknowledge the differences between the different types of technologies. A phone call does not allow for visualisation whereas a video call does. Focusing on specific technologies may have generated more applicable results. The original research recruited patients who had opted into these studies. Patients who are satisfied with these technologies are more likely to be recruited to telemedicine studies and may not be a representative sample.

3.6 Conclusion

We reviewed eight qualitative studies which reported the use of phone or videocall in orthopaedic care and found that the use of virtual consultations changes the work of being a patient. We identified four different kinds of work relating to: (1) the consultation, (2) the use of resources, (3) changes in the environment and (4) interactions with the healthcare professional. Across all four domains, the change in work required of patients can be both burdensome (it makes it harder for patients to access their care) and beneficial (it makes it easier for patients to access their care). The burden experienced by patients is a result of the relationship between the demands of the work and their capacity to fulfill these demands. Such burden is individual and situational, depending on the clinical requirements and the patient’s lifeworld. As a result, we have proposed that the work of being a patient influences their preferences and the resulting choice has consequences on the resulting work that is required of them. Changes in circumstances (such as availability of equipment, understanding of how to use the equipment, requirements of the rehabilitation) may alter what is required both clinically and technologically and influence preferences. This is an important consideration to patients, clinicians, managers and policy makers, especially at a time where the use of technology is being favored during the COVID-19 outbreak. We have demonstrated the importance of considering the work of being a patient when designing and implementing new technologies. Keeping the concept of patient work at the heart of technology implementation is essential to ensure successful uptake in practice.

3.6.1 Patient and Public Involvement

The CONNECT Project Patient and Public Involvement steering group (PPISG) has been set up to provide guidance on the conduct of the research (details available from www.theconnectproject.info). The first meeting of the PPISG was held in August 2016 prior to the submission of the research to the NIHR in May 2017. A discussion was held about the overall research aims which supported the identification of the research questions. The PPISG has supported the design of the overall research plan and will continue to be involved during the development and refinement of each Phase prior to the completion of each study protocol. In addition, the PPISG will support the development of the lay-summary outputs to be disseminated to patients and members of the public. Links to research outputs will be made available on the CONNECT Project website available at www.theconnectproject.info.

3.6.2 Acknowledgements

The authors thank Professor Maria Stokes and members of the CONNECT Project Patient and Public Involvement steering group for their invaluable contributions to the overall study design of the CONNECT Project and obtaining funding for the PhD Fellowship. The authors also thank colleagues within the Therapies Directorate and Research and Innovation Centre at the Royal National Orthopaedic Hospital for their ongoing support.

3.6.3 Contributors

AWG wrote the paper and conceived the project with CRM and JJ. CRM contributed knowledge on systematic reviews and qualitative analysis. AWG and AJ completed the literature search, identification of papers and quality analysis of papers. CM, JJ, and AJ edited and critically revised the paper. All authors have read and approved the manuscript. AWG is the guarantor of the manuscript.

Chapter 4 Factors that influence patient preferences for virtual consultations in an orthopaedic rehabilitation setting: a qualitative study

This paper has been published in BMJ Open and is included as a ‘published version’. The full reference is: Gilbert AW, Jones J, Stokes M, May CR. Factors that influence patient preferences for virtual consultations in an orthopaedic rehabilitation setting: a qualitative study. BMJ open. 2021 Feb 1;11(2):e041038. The formatting, spelling, and referencing for this paper are presented according to the journal’s style requirements. In line with the Creative Commons license under which this paper was published, and the publisher’s rights and permissions for open access publications, no additional permissions are required to include this article in this thesis as long as the appropriate citation is made. *The text in italic specifies additional detail required to fulfil the requirements of a PhD by the University of Southampton.*

4.1 Abstract

Objectives

To identify, characterise and explain factors that influence patient preferences, from the perspective of patients and clinicians, for virtual consultations in an orthopaedic rehabilitation setting.

Design

Qualitative study using semi-structured interviews and abductive analysis.

Setting

A physiotherapy and occupational therapy department situated within a tertiary orthopaedic centre in the UK.

Participants

Patients who were receiving orthopaedic rehabilitation for a musculoskeletal problem. Occupational therapists, physiotherapists or therapy technicians involved in the delivery of orthopaedic rehabilitation for patients with a musculoskeletal problem.

Results

Twenty-two patients and twenty-two healthcare professionals were interviewed. The average interview length was forty-eight minutes. Four major factors were found to influence preference: the situation of care (the ways that patients understand and explain their clinical status, their treatment requirements, and the care pathway), the expectations of care (influenced by a patients desire for contact, psychological status, previous care and perceived requirements), the demands on the patient (due to each patients respective social situation and the consequences of choice) and the capacity to allocate resources to care (these include financial, infrastructural, social and healthcare resources).

Conclusion

This study has identified key factors that appear to influence patient preference for virtual consultations in orthopaedic rehabilitation. A conceptual model of these factors, derived from empirical data, has been developed highlighting how they combine and compete. A series of questions, based on these factors, have been developed to support identification of preferences in a clinical setting.

Strengths and limitations of this study

- This is the first qualitative investigation of patient preferences for virtual consultation in a tertiary orthopaedic setting.
- Theoretical insights and explanations generated from this paper are developed from empirical data.
- Maximum variation sampling and abductive qualitative analysis reveal key factors that shape patient preferences.
- Single site qualitative study is not generalisable but mechanistic model is likely to be transportable between settings.

4.2 Background

Videoconferencing technologies, such as Skype, Zoom, Attend Anywhere and MS Teams, have been received enthusiastically by healthcare policy makers[4,137,138] as they provide a medium to improve access to care. The technology is also viewed as a significant contributor to health and wealth[139] and efficiency gain strategies.[1] Videoconferencing technologies are being used across many fields of healthcare[16] and can offer advantages to patients. In January 2020, the United Kingdom recorded it's first case of Novel Coronovirus (COVID-19). The outbreak of COVID-19 placed the NHS under significant strain. Social distancing measures were introduced in the United Kingdom in March 2020 and Virtual Consultations (VC) (via telephone or video call) were identified as a potential alternative to face-to-face consultations at this time.[135,136] Organisations were forced to rapidly implement VC as a consequence of COVID-19.[31]

Greenhalgh et al[108] conducted a multilevel mixed methods study of Skype consultations and found that they were safe, effective and convenient for patients when healthcare professionals judged them clinically appropriate. However, the authors[108] found that the reality of establishing VCs in outpatient services was more complex than originally anticipated. This complexity is a longstanding problem in the implementation of telemedicine and telecare systems.[88]

Patient preferences and burden of treatment

A preference can be defined as an individualised 'total subjective comparative evaluation'.[5] Put simply, an individual weighs up the characteristics of alternatives to make a decision. Preference theory suggests that a person will prefer the outcome that yields greatest utility, and therefore that patients would prefer a VC if they believe its benefits outweigh its burdens.[5] To date, patient preferences for telemedicine have only been investigated at a general population level.[124]

VCs have been shown to change what is required of patients.[49,98,49] A workload for patients that exceeds their capacity has been demonstrated to be a driver of treatment burden for those with lung cancer and chronic obstructive pulmonary disease.[91] Treatment burden in patients with stroke has been shown to be influenced by the quality and configurations of healthcare.[140] What is not yet understood is how changes in the work and demands of being a patient as a result of VC influence preference for VC in a healthcare setting.

Patients' and professionals' preferences for telemedicine are not isolated from their other experiences of healthcare, or from the ways that they experience other aspects of their lives. If we are interested in the ways that patients understand and calculate the relationship between benefits and burdens, then we should also include burdens in our investigation. Shippee et al's[92] cumulative complexity model assumes an arithmetical relationship between delegated health system workload and individual patient capacity, and suggests that this explains healthcare utilisation. However, health behaviours and service utilisation take place in a broader social context, and Burden of Treatment theory (BoT)[51] provides a way into this problem. BoT explains the relationship between the demands that participating in healthcare places on patients and caregivers (their workload), and the affective, cognitive, relational and material resources that they can bring to bear on this workload (their capacity).[52,69]

To our knowledge, no studies have yet investigated the relationship between patient preferences around telemedicine services and their experience of burden of treatment. We need to better understand this to support the development of care pathways that take into account what offers patients increased utility. This paper therefore aims to identify, characterise, and explain factors that influence patient preferences for VCs in an orthopaedic rehabilitation setting.

4.3 Methods

This paper is part of a larger body of work and forms Phase II of the CONNECT Project. The protocol for the CONNECT Project has been published elsewhere.[97]

4.3.1 Setting

The research was conducted within a single specialist orthopaedic hospital in North London, UK. All participants were recruited from the Occupational Therapy and Physiotherapy Department.

4.3.2 Participants

A maximum variation sample was recruited; we intended to sample our patients on a set criteria of variation (set for age and gender for patients and occupation for clinicians). This included 22 patients and 22 healthcare professionals (see Table 2 on page 27 for the inclusion and exclusion criteria). We aimed to recruit as least 10 male and 10 female patients (10 <50 years, 10>50 years) and 20 healthcare professionals (occupational therapists and physiotherapists). Patients were selected to be interviewed to identify factors that influence patient preferences for VCs. Clinicians were selected to be interviewed to provide their perspectives on patient preference and as patient preferences are moderated by the possibilities and preferences of organisations and staff. The first two patients and healthcare professionals were used to pilot the interview schedule (See Appendix F on page 323).

4.3.3 Recruitment

The study was advertised using a pop-up banner in the Occupational Therapy and Physiotherapy Department *within the single site*. *The following steps were taken for recruitment:*

- *Patients meeting the inclusion criteria were alerted to the study by the presence of the pop up banner in the waiting areas or by their treating clinicians.*
- Patients were encouraged to discuss the study with their treating healthcare professional or could approach the researcher directly via email.
- Healthcare professionals were sent a departmental wide email informing them of the study both from the perspective of discussing with patients as well as enrolling as a participant.
- Suitable and interested potential participants were provided with a participant information sheet and given at least 24 hours to discuss the study with the researcher.
- Patients and clinicians were enrolled in the study upon receipt of informed written consent.

4.3.4 Data Collection

Design of the interview schedules were formed by Burden of Treatment Theory[51] (see Appendix F on page 323 and Appendix G on page 329) and the results of Phase I of the CONNECT Project.[98] Interviews were conducted on site at the hospital or virtually using phone or SKYPE. Interviews were conducted by AWG and were to last around 60 minutes with the option to extend or shorten as required. All interviews were audio recorded and sent off for transcription to an external company. *All transcripts were reviewed by the lead researcher to check for accuracy against the audio recordings.* All transcripts were emailed or posted to participants upon receipt to give them the option to verify these data or to make any adjustments.

4.3.5 Data Analysis

A full representation of Data analysis can be seen within Appendix H on page 335. Images are referenced within Appendix H to aid the illustration of the process.

Data analysis took the following form:

- *Interview transcripts were reviewed by AWG and CRM prior to coding.*
- *Interview transcripts were* uploaded into NVIVO (version 12).
- Data analysis followed the principles of abduction as set out by Tavory and Timmermans.[95]

- Coding was undertaken by AWG and CRM; open coding techniques were used to *label* these data. *Open coding was undertaken within NVIVO.* Figure 19 *on page 336 within Appendix H demonstrates open coding for the node 'worries about employment prospects or being sacked for taking time off.'*
- *The NVIVO nodes were exported into Microsoft Excel for thematic analysis. At this stage, a preliminary taxonomy of the NVIVO nodes were arranged into initial empirical regularities (themes) following the qualitative interviews. (Figure 20 on page 336)*
- *Themes of codes were then grouped together within maps on A3 paper (Figure 21 on page 337) and refined following discussion between AWG and CRM.*
- Data that matched the results of the CONNECT Project Phase I were temporarily set aside; this research sought abductive 'surprises' (new themes) in additions to those gained from our previous work *(Figure 22 on page 338 and Figure 23 on page 339).*
- Useful data to support the design of a Discrete Choice Experiment (a forthcoming paper that constitutes Phase III of the CONNECT Project) were also set aside.
- *Following the mapping process, nodes were relabelled within Microsoft Excel to arrange these data into a taxonomy.*
- The new themes were interrogated for attributions about patient preferences and the factors that shape them *(Figure 24 on page 340).*
- Attributions were assigned to codes within these new themes following discussion between AWG & CRM.
- Attributions were subsequently discussed between AWG and JJ to ensure they made sense and were accurate representations of these data.
- No changes were required to attributions at this stage. Inferences were made about the ways that preferences worked, the relative position and significance of the factors that shaped them, forming abductive explanation.
- Data matching the themes from Phase I were then incorporated once theoretical insights were formed.
- Finally, themes arising from the data were mapped out in a model by AWG to visualise how different factors might influence preference for virtual consultations (Figure 25 *on page 341*). The theoretical model was reviewed by all authors to verify its content.
- A summary of these methods can be seen in Figure 5. Reporting was conducted using the Standards for Reporting Qualitative Research[141] (see Appendix I on page 343).

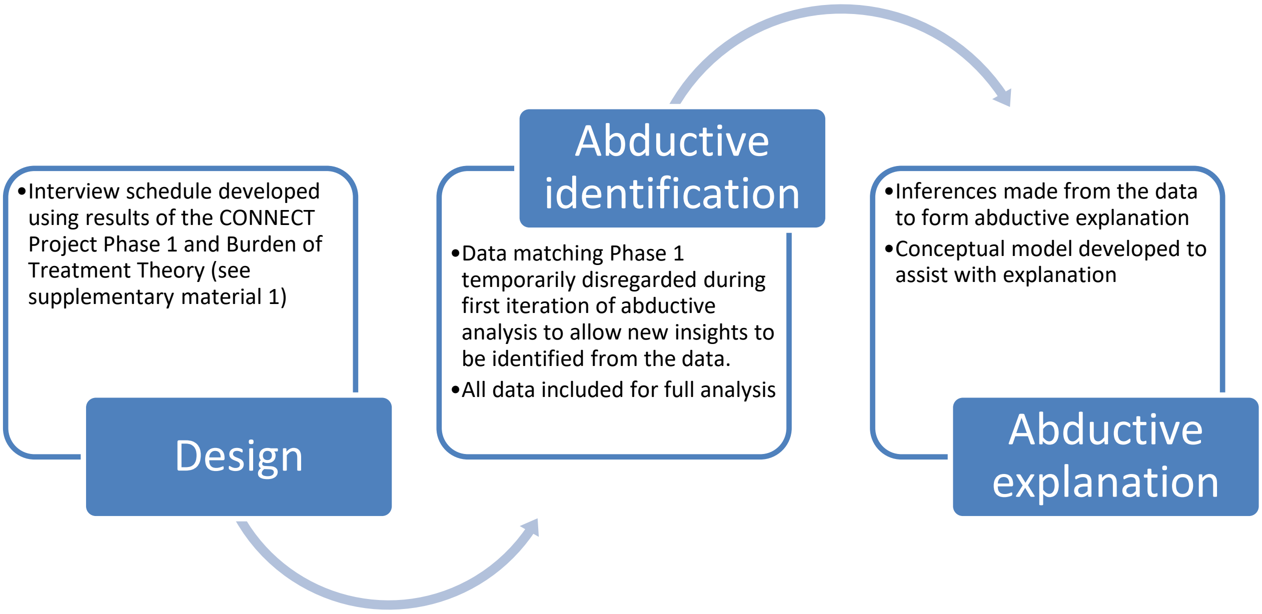

Figure 5 Flow diagram of methods

4.3.6 Patient and Public Involvement

The CONNECT Project Patient and Public Involvement steering group (PPISG) has been set up to provide guidance on the conduct of the research (details available from www.theconnectproject.info). The first meeting of the PPISG was held in August 2016 prior to the submission of the research to the National Institute for Health Research in May 2017. A discussion was held about the overall research aims which supported the identification of the research questions. The PPISG has supported the design of the overall research plan and will continue to be involved during the development and refinement of each Phase prior to the completion of each study protocol. The participant information and consent forms and the discussion guide for this research was reviewed by the PPISG. In addition, the PPISG will support the development of the lay summary outputs to be disseminated to patients and the public.

4.4 Results

No changes were made to the interview schedule after the pilot interviews and these data were included in the study. Fourty-four participants were interviewed in the study; 22 patients (12 female, average age 46 [range 20-78]) and 22 healthcare professionals (13 physiotherapists, 14 female). The average interview length was 48 minutes [range 28 – 81 minutes]. Two patient interviews were conducted over the phone and two over Skype. Two healthcare professional interviews were conducted over the phone. No participants returned their transcripts and therefore no amendments were made.

4.4.1 Interview Data

Four themes were identified from the data: (i) the situation of care, (ii) expectations of care, (iii) demands on the patient and (iv) capacity to allocate resources to care. Results from interviews are presented by theme and evidenced in Table 7 (page 70), Table 8 (page 74), Table 9 (page 78) and Table 10 (page 83) which present data from both patients and healthcare professionals.

4.4.1.1 Theme 1: Situation of care

The situation represents the ways that patients understand and explain their clinical status, their treatment requirements, and the care pathway.

4.4.1.1.1 Clinical status

Patient preferences varied based on the clinical challenges patients faced at that time and the patient's capacity to meet the demands the clinical status required. Healthcare professionals had an awareness of the volatile nature of patient's clinical status. Patients who had a long term orthopaedic condition had an awareness that their clinical status has the potential to both worsen and improve with some patients experiencing this degree of volatility. The patient's orthopaedic problem could standalone or was in conjunction with other physical or mental health issues.

4.4.1.1.2 Treatment requirements

The requirements of treatment are dependent on the clinical status of the patient, in accordance with the normal management for that status. A spectrum of management strategies may be required, some of which traditionally require hands-on treatment and others which can be delivered without physical contact. Some clinical status' require forced restriction of activities which make physical attendance challenging, whereas other status' require physical contact.

4.4.1.1.3 Care pathway

Patient preferences are influenced by the care that is available. This includes the length of the appointment, number of appointments and regularity of these and the time of day of the appointments. Some patients who found accessing care challenging would feel less inclined to travel if the appointment was very short or at an inconvenient time of day. Others would be prepared to travel, whatever the offering. Regular repeated appointments can be burdensome for patients, particularly those with other commitments that might use up capacity. Patients with infrequent appointments appeared to favour face-to-face (F2F) appointments, although there were exceptions to this. Healthcare professionals commented on the rigidity of corporate resources, with some finding the volume of workload reduced their capacity to be flexible, for instance finding time to support patients with managing their VC.

Table 7 Theme 1: Situation of Care

Factor	Description	Patients Accounts	Healthcare Professionals Accounts
Clinical status	The healthcare complaint the patient experiences, its stability, reversibility and its impact on the patient in conjunction with other complaints.	*If I'm having a flare-up, sometimes I can't even leave the house. I get stuck indoors and I just wouldn't be able to do much really [P7]* *It was really annoying because it had, like, dislocated, it was dislocated loads before and after to the point that it was really affecting my life. Then I got banned from doing stairs, I couldn't go out here, I couldn't go out there, couldn't really walk anywhere [P5]*	*You go back, and then sometimes they make an x amount of improvement, or they have a flare up and then it goes back a bit because they get really stressed out. They're back to that fearful of movement [C7]* *They're not managing those flare-ups particularly well, so they end up missing classes and things like that. It's become a bit of a spiral to have that - the physical is having a knock on the mental which is having a knock-on effect on the physical and they're just spiralling out of control [C14]*
Treatment requirements	The treatment and management of the complaint that is required.	*But after surgery, I was literally bedbound for three months, so for three months I couldn't do anything [P20]*	*… building arm strength, stability, muscle patterning, working whole kinetic chain, core stability, lots and lots of gluteal rehab, putting a big emphasis on to their understanding of what's a good muscle ache and what*

	The restrictions imposed on the patient.	*We're just building up my stamina I think at the moment. Not with the hands but with the shoulders. We're just starting slow, building up [P3]* *So, they've basically come up with a programme for my gym telling me how often I should do it, giving me encouragement saying you're a bit better [P6]*	*they should be feeling and what's working to fatigue rather than what's working into their pain, and then understanding what's an okay pain to have, what's okay to work through, what's not okay to work through [C11]*
Care Pathway	The availability of healthcare to the patient	*On a Skype, are you going to have a half an hour appointment? Or are you just - is it just a check up to see that you're doing the exercises correctly and they say, right, okay, fine carry on with those? Or that looks really good. So, I think it depends on the time apart, how far you are from the hospital [P2]*	*…face-to-face slots for me particularly can be - would be really normal to have to wait six to eight weeks for another appointment just because of our system and the vast amount of patients that we have [C15]* *I think doing it as an adjunct where it's extra, we just don't have the capacity for a start, even if it was to [text doing], doing things like that. I think that would be difficult to fit in [C1]*

		So if it was once every three months, I'd definitely prefer to have - and so, maybe the later stages and everything's better, then I wouldn't mind having the Skype session, but in terms of the actual rehab and getting from surgery back to performance, I'd definitely like to see a physio. [P20]	*At the moment our face-to-faces are an hour. We don't know that when we do virtual it could be actually much more efficient for us. We could do a really good 30-minute telephone consultation and we can actually fit more of them in [C18]*

4.4.1.2 Theme 2: Expectations of care

Patients have expectations for both VC and F2F consultations. These expectations are influenced by a patient's desire for contact, psychological status, previous care and perceived requirements.

4.4.1.2.1 Desire for contact

Patients had beliefs about the effectiveness of a VCs in comparison to a F2F therapy session. They preferred F2F consultations if they believed they would have more favorable outcomes as a result. Patients also preferred F2F contact if they felt their condition was complicated and warranted a physical examination. Healthcare professionals believed that VCs were not capable of delivering the physical aspect of a session.

4.4.1.2.2 Psychological status

Patient motivation and self-efficacy was an important consideration for both patients and healthcare professionals. Some patients felt they were less likely to complete prescribed care if they were attending virtually whereas others felt that VCs could reduce the anxieties associated with F2F interactions and travelling into the hospital. Some patients, however, found the idea of seeing themselves on a screen stressful. Healthcare professionals had an awareness of the potential limitations to offer empathy via VC to the patients who desired it.

4.4.1.2.3 Previous care

Patients previous experience influenced their preference for VC. Patients who had built up a good rapport with their current care team felt that they want F2F to continue whereas others felt that, as they trusted their healthcare professionals, they would be willing to try a new innovation. Patients who had received sub-optimal care elsewhere felt that they would be more likely to stick to the status quo if this worked well for them. Healthcare professionals were sensitive to the varied experiences and expectation of patients.

4.4.1.2.4 Perceived requirements

Patients who feel the need for hands on F2F care reported a preference towards F2F care. Patients who did not feel this was necessary did not feel the same way towards this. Care requirements differed based on the individual circumstances of the patient and the length of time of the appointment. Patients who travelled less frequently preferred to receive a physical examination, often as a 'checkup' to assess the physical status of the problem.

Table 8 Theme 2: Expectations of Care

Factor	Description	Patients Accounts	Healthcare Professionals Accounts
Desire for contact	Whether the patient / healthcare professional believes the F2F is more of a capable method of care delivery than VC.	*I'm sure I could do that at home on my own but personally I would feel comfortable knowing I've got a person actually feeling it. [P16]* *If it's something simple then, yes, that's a good idea. If it's something a bit more complicated they actually have to come and see it because it's more of a hands-on type of thing [P8]*	*we definitely can't do is gait re-education or gait analysis. We could probably demonstrate exercises ourselves, but actually if we're looking at a movement habit in terms of, say, how someone's shoulder moves, or you need to really see or perhaps feel what that is, I think that's obviously not able to do that [C15]* *Obviously, if it was a more physical session, if it was a practical session, that's not going to work particularly well; it's not going to work very well on Skype [C12]*

Psychological status	The psychological status of the patient and the impact of this on care across different delivery formats.	*One of the reasons why the screens would be good is I would feel less anxious to talk to someone through a screen, but I would in the same room [P9]* *You don't like the way that your life's going to look because you know you're not going to be able to achieve all the things that you want to achieve [P17]* *Over the years I have done a lot of leg and knee exercises… especially immediately after surgery… I probably should keep them going but I have to say I haven't. [PP2]* *I guess because I was in a leg brace for so long, stuff did get shouted at me and I did get called things and that, so my self-confidence isn't the best in the world […] So to see myself in the corner of a screen doing something, it would stress me out for quite a huge amount of time. [P5]*	*It might also make them feel a bit less anxious about having to travel, having to worry if my therapist or whoever I'm coming to see makes me feel welcome or makes me feel comfortable… It might make them feel a bit more comfortable if they're in their own environment [C16]* *I think it's that how much do the patients value that just talking to someone in person, that relationship side of things and those sorts of things that maybe they might not feel so safe to do … and also sometimes patients just want a hug [C1]*

Previous care	Experience of previous care	*Yeah, I think you, for me, I feel like I've been able to build up more of a bond with them all because I've seen them in person, whereas if it had been over a screen or a phone, I don't think I would have had that [P5]* *So, I've had physio on and off for fibromyalgia and actually I've been able to connect with this much better because of the way it's delivered [P3]*	*I don't think you can give a one size fits all to people. Some men particularly they just want a number, they want a number, they want sets they want reps. They just want a very clear structure and some people just you have to go that way because they react better to it. They're more likely to be more adherent to exercise if they go that way. Other people it's just a case of listening to your body, see how you feel, see what you manage. Because if you push them too far or push too little you could - you're just going to end up failing them, I think [C14]*
Perceived requirements	The negotiated requirements of the session	*`We tend to come down to RNOH probably once every six months now just for a check-in… so that she can then check up on those joints and make sure that I don't need to change what I'm doing or we don't need to look into it and get things investigated with orthopaedics [P17]*	*I think it also depends on the population. Not everyone has complex needs as well. I think if we have a routine primary knee replacement there's no reason why you can't get everything. If you have a flare referral you'd be fine to do a 30 minute, whereas if you have a revision who's had five surgeries, 30 minutes is probably not going to be enough, because there will be a lot of belief systems around that which probably need to be looked into. So, yes and no. It depends on what the patient group is [C7]*

4.4.1.3 Theme 3: Demands on the patient

Patients may face multiple and differing demands dependent on the choices they make regarding a VC or a F2F consultation. Demands include the care requirements, social demands and the consequences of choice.

4.4.1.3.1 Care requirements

The care requirements are dependent on the clinical status of the patient. Patients may be required to complete complex exercise regimens or perform assessments. Some of these initiatives may benefit from optimal visualisation of movements. Some of these may require hands on facilitation. For others, manual therapy may be indicated. Preferences are likely to be mediated by what the healthcare professional believes and the consequence of choice will change the demands on patients. These changes may be burdensome depending on the patient's capacity.

4.4.1.3.2 Social demands

Some patients in this study reported a vast array of social demands that interfered with healthcare, such as caring for elderly relatives or young children. Often, these conflicting demands interfered with the patient's ability to attend their own appointments and rehabilitation. Patients who reported excessive social demands reported that in some circumstances VCs could be more favorable.

4.4.1.3.3 Consequence of choice

The use of virtual consultation equipment may require a new skill set. Patients might also need to obtain rehabilitation equipment and technology for VC. Patients who did not have the space and rehabilitation equipment available preferred to travel in for a F2F consultation. Patients that found the idea of interacting with their rehabilitation professional over a screen challenging where more likely to prefer F2F appointments whereas others did not see this as an issue. Overcoming the lack of physical contact and adapting assessments proved to be an issue for some. The lack of a suitable rehab environment was a concern to some healthcare professionals.

The demands faced by patients arose as a direct result of the situation in conjunction with the capacity to fulfil the demands. Patients who felt that VCs were less burdensome may have a preference towards VCs whereas those who find them more burdensome may have a preference towards F2F consultations.

Table 9 Theme 3: Demands on the patient

Factor	Description	Patients Accounts	Healthcare Professionals Accounts
Care requirements	The requirements of care	*It depends what you're asking them to - if it was - it depends. If it's something simple then, yes, that's a good idea. If it's something a bit more complicated they actually have to come and see it because it's more of a hands-on type of thing [P8]* *I suppose it's not so much the conversations but the physical things that you might have to do. It would be very difficult for them to work out - if you're talking physiotherapy - just how your joints were working. They couldn't really see what your back was doing or how your arm was working or whatever, and you can't - they need to feel. Physiotherapy's quite a hands on the body sort of thing [P4]*	*How many exercises can they realistically fit in their day? I'd rather they did one or two really well then five or six badly [C11]* *I guess if they've had no restrictions really at all, then to completely have those restrictions - and it can be quite debilitating because they're so used to being independent and not having to really rely on others [C4]* *we do often use our hands for some assessment in terms of feeling for muscle-activated patterns or guarding [C15]* *We do lay on our hands. It might well be around showing someone that they've become really hypersensitive. Touching them on an area of skin that is not at all uncomfortable and saying what does that feel*

		It's ridiculous in the sense that appointments have almost become a full-time job for me. I'm really grateful, I've got a lovely team of people that know me very well and look after me [P10]	*like, does it feel like I'm poking, whatever, and then putting your hand on their back or something and then say how does that feel? [C10]*
Social demands	The competing life demands that can interfere with healthcare.	*I think, because I'm not looking after my mum, my mum has gone into a care home now. At the moment I haven't a job. I'm not working. I'm at home, I'm just doing things at home. I still go to the care home and sort things out for mum and appointments and that [P2]*	*I think for some people things are muddling along and I probably should work on my routine, but I've got my kids, I've got my work - this takes priority and that's I think my role is trying to tease that out a bit more. So, what is your priority right now? [C12]* *Maybe this is where the overwhelmingness comes in because if you are not doing any of things you suddenly feel like you have to change your entire life to be able to manage if some of what we have said isn't said carefully [PC1]*
Consequences of choice	The impact of choice	*For me, it's the equipment. I only live in a small - and it is small, isn't it - a small two-bedroom house.*	*You might subconsciously use that [travel time] in a beneficial way… If you are straight in on a computer screen maybe there is some prep time that is not build*

		I would have nowhere to store the equipment… there's no option out there to rent equipment [P19] *Some of the stuff he doesn't need to touch me for, like when he's watching me do a squat. Are my knees going the right way? Yeah. He can do that over a FaceTime. That's absolutely fine. But as you say, he needs to - if he wants to check my strength physically, then yeah, I need to be here. It only limits that [P14]*	*in to the process as easily and you have to be mindful of preparing yourself beforehand [PC1]* *If you think about the patient that is actually sent into a flare-up from the journey that they've made… [C8]* *So often if they want to try and demonstrate exercises, a common feedback is the fact that their bed's too hard or too soft and it doesn't work, and the plinths are easier to do it [C1]*

4.4.1.4 Theme 4: Capacity to allocate resources to care

Capacity is the patient's ability to allocate resources to care. These resources are financial, infrastructural, social and healthcare related.

4.4.1.4.1 Financial

Patients found that the demands of travel to a physical appointment can be costly, particularly when this entailed long journeys by public transport. Some patients were required to take unpaid leave from employment or risk losing their job. Some patients had supportive employers or did not feel significantly impacted through the cost of attendance. Healthcare professionals were aware of these financial challenges faced by patients.

4.4.1.4.2 Infrastructure

Patients needed to have access to the hardware and software in order to use VC as a form of consultation. There was a requirement to understand how to use the technology in order to undergo a successful VC. Variations of hardware and software exist. There did not appear to be any relationship with type of hardware and software combination and preference. Some devices with larger screens were thought to be more beneficial and influence *expectations*. In addition, patients needed to have access to a suitable environment and equipment in order to undergo virtual rehabilitation.

4.4.1.4.3 Social capacity

Patients who had a support network available to them found this was a useful resource. Family members were able to assist with the logistics of travel to appointments, activities routines at home and motivation to engage with rehabilitation programmes. Healthcare professionals reported ways in which patients could enhance capacity through their social networks.

4.4.1.4.4 Healthcare system

The healthcare system can provide capacity. For example, some patients received hospital funded transport making attendance at the hospital easier. Healthcare professionals are skilled at facilitating motivation and behavior change which could improve capacity. Expectations of success may provide patients with additional motivation and self-efficacy to achieve the demands required of them.

Capacity is an important mediator of preference as it dictates whether or not a patient has the available resources to meet the demands of the situation and the expectations. Capacity is a mediator between the types of influences at work and has a direct influence on preference (see Figure 6 on page 87).

The *Situation* is a factor that influences preference. Each situation is unique to the individual based on their clinical status, treatment requirements and the availability of care. The situation is influenced by the *Capacity* of the patient which in turn influences the *Demands* and the *Expectations of* patients. Whilst certain factors influence preferences for a patient in one direction, other factors may have an opposite effect.

Table 10 Theme 4: Capacity to allocate resources to care

Factor	Description	Patients Accounts	Healthcare Professionals Accounts
Financial	The ability to free up financial resources	*So obviously taking an afternoon off as annual leave or whatever wouldn't result in a disciplinary, but then in the long-run I have to think… [P5]* *If you're doing it once a week or something, you're spacing it out… it's travelling there. That would be - it's expensive to travel up here because it's not exactly in the closest of areas, it's in the middle of nowhere [P7]*	*They might have a bit more support but again they've then got to think about to do - if they're paying for it privately there's the added cost to them [C4]* *When I think about some of these patients that come like three hours on public transport - what a waste of money that is. I think of patients that come all the way from Birmingham and Brighton. That doesn't make any sense to me, and actually at times I have said I think we should do this on the phone [C17]*
Infrastructure	Access to material and informational resources	*You could get a stand and you'd be able to see everything really. If you put it on a table, if you need to sit on a chair. You could pull it a bit away from you so they can see you. I reckon definitely it would work [P7]*	*If you haven't got a laptop and Skype at home, then you're probably not going to be that techy, that tech savvy, and that open to learning how to use a tablet that you've never used before or something, probably [C19]*

		I would either Skype on my laptop or Skype on my thing, and if I could transfer to the TV, you know? I've got a smart TV, it could be done that way. Because if you've got a bigger picture you could see more, you could do more, whereas if you've got a little screen your vision is very limited to a little square [P8]	*They would need access to the technology… do they have the internet, do they have a connection, do they have a smart device, do they have a way that they can use that and are they familiar with their platform… a prime example is SKYPE. iPhone users tend to use Facetime so do they have a SKYPE account, are they able to set it up? I think it's that accessibility, and it's have they used it before which is a big thing… [PC2]*
Social capacity	Support available through social network	*I have a husband who does lots of stuff for me... I can't do housework because I can't lift an iron anymore [P4]* *Without that group, I think I would just be in bits right now to be honest. [P14]*	*This lady, who I was talking about just before, she lived by herself and she hasn't got any carers but the family was helping [C2]* *More patients are having their family members helping them with these things at home and that visit regularly. There's no reason why that can't be - if they're turning up to help them put on TED stockings, then I'm sure they can help them turn on a tablet and watch something [C5]*

Healthcare system	Sources of healthcare capacity	*I think it's emotional support as well. I suppose in my case because I've had so many mental issues attached to my disorder, I have found support here from an orthopaedic point of view. When I had a setback and I was told there was a potential another infection in my bone I went to pieces here, and I saw [anonymised]. He was so reassuring… I know I've got security because I feel [anonymised] knows my case so well, and he knows what happened [P10]* *it's difficult for me, I can't use the underground or anything like that so I use the patient transport and they fetch me… some of those appointments have been 10 minutes or so and I have used the patient transport… [PP2]*	*But the skill then is to watch your language and rather than tell someone how easy it is, or tell someone the solution, again that's where motivational interviewing comes in. Rather than saying but you can just pace, let's work out how you can pace, say something like is there anything that you've been learning that you feel could give some boundaries there or anything you've tried? So again, you're getting the person to solve their own problems [C13]* *Sometimes the hospital transports are not quite helpful for them. They don't come on time, so they delay sometimes. She ends up missing her appointment because of a delay in the hospital transport [C2]*

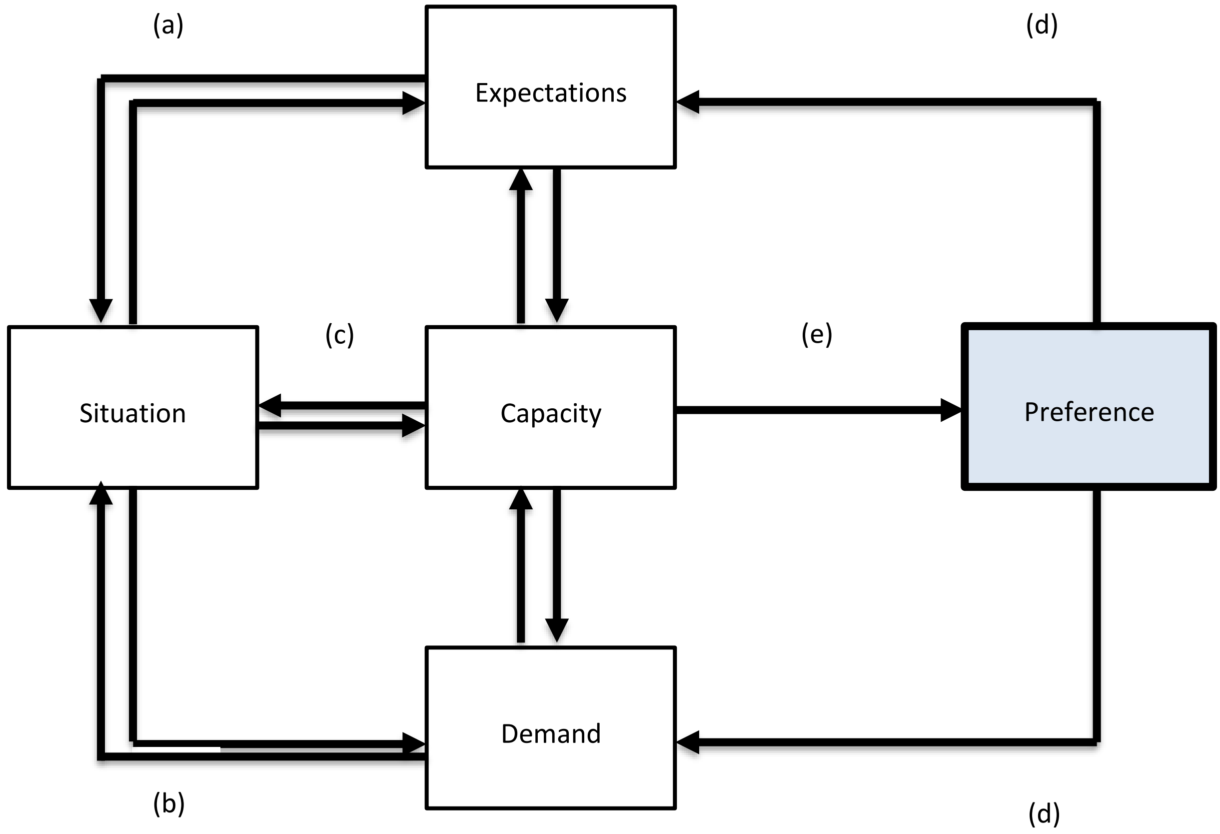

Figure 6 Model to illustrate interactions between mechanisms that influence preference for virtual consultations

(a) The relationship between *Situation of care* and *Expectations of care*
(b) The relationship between *Situation of care* and *Demands of care*
(c) The relationship between *Situation of care* and *Capacity to allocate resources to care*
(d) The consequences of *Preference*
(e) The formation of *Preference*

4.5 Discussion

This paper outlines four key factors and describes mechanisms that influence patient preferences in the context of VC for orthopaedic rehabilitation. These factors have been empirically derived. These factors have been identified and characterised and can be mapped as an explanatory model that demonstrates the interplay between factors and how they interact to influence preferences.

(a) The relationship between *Situation of care* and *Expectations of care*

The situation informs the patient's expectations of care. If the situation demands F2F (or VC) the patient will be required to decide whether F2F (or VC) would be the most suitable alternative based on the care they expect to receive. These expectations influences the situation of care for the patient.

(b) The relationship between *Situation of care* and *Demands of care*

The situation requires the patient to perform specific tasks to engage in their care. These demands will fluctuate as the clinical status and the treatment requirements fluctuate. The availability of the care pathway may remain fixed or fluid dependent on the specific situation. Resources available through capacity will dictate the demands of the situation. Competing demands on the patient may reduce available capacity to complete the demands of care dictated by the situation. The demands on the patient, and their interaction with the patient's capacity in turn influences the situation.

(c) The relationship between *Situation of care* and *Capacity to allocate resources to care*

Patient capacity influences patient expectations indirectly via the demands and expectations of care. In addition; the capacity of the patient to engage with care itself can influence the situation as resources may be allocated to the patient by the healthcare provider depending on a need's basis, for example, whether a patient qualifies for hospital funded transport. The capacity of the patient to engage with care is therefore directly dependent on the situation.

(d) The consequences of *Preference*

The preferred choice between a F2F and a VC has consequences. The consequences of choice directly impact on the demands of the patient and their expectations of care. Changes in expectations and demand in turn influence the patient's capacity and the situation.

(e) The formation of *Preference*

The formation of preference, within this study, is the resulting process of complex factors interacting with one another. The establishment of the situation and capacity dictate the expectations and demands of care. Preferences are established following a total (considering the options available) subjective comparative (these options are compared based on the patient's experience) evaluation (the option with the most utility is selected).

A total subjective comparative evaluation is a cognitively demanding task.[5] We have found, from this research that multiple factors are at play that combine and compete. To ask sensitising questions in relation to these factors may facilitate the cognitively demanding task of preference formation. These results can therefore be applied to clinical care in the form of sensitising questions for clinicians to ask patients to support formation of preferences for or against F2F (or VC). These questions have been developed from the results of this study are demonstrated in Table 11 and are suitably generic; they can be applied across all areas of healthcare as they are not limited to orthopaedic rehabilitation. Illustrations with sensitising questions are presented (Figure 7 on page 94 = Situation of care, Figure 8 on page 95 = Expectations of care, Figure 9 on page 96 = Capacity to allocate resources to care, Figure 10 on page 97 = demands of care).

Table 11 Practical questions to support formation of preference

Theme	Factor	Description	Practical questions to support identification of preference for patients	Practical questions for clinicians to ask patients to support identification of preference
Situation of care	Clinical status	The healthcare complaint the patient experiences, its stability, reversibility and its impact on the patient in conjunction with other complaints.	• Does my problem require me to be seen in person? • Would having a virtual appointment make things easier for me?	• Does your problem require you to be seen in person? • Would having a virtual appointment make things easier for you?
	Treatment requirements	The treatment and management of the complaint that is required. The restrictions imposed on the patient.	• Can the treatment I need be delivered virtually?	• Do you think the treatment you need can be delivered virtually?
	Care Pathway	The availability of healthcare to the patient.	• What do I need from my clinician to support me with a Face-to-face or a virtual appointment?	• What can I do to support you with a Face-to-face or a virtual appointment?

Expectations of care	Desire for contact	Whether the patient / healthcare professional believes the F2F is more of a capable method of care delivery than VC.	• Do I think my issue can be best managed by a face-to-face or a virtual appointment? • Does my healthcare professional think my issue can be best managed by a face-to-face or a virtual appointment?	• Do you think your issue could be best managed by a face-to-face or a virtual appointment? • Do you believe I think your issue could be best managed by a face-to-face or a virtual appointment?
	Psychological status	The psychological status of the patient and the impact of this on care across different delivery formats.	• How would a virtual appointment affect me? • Am I comfortable seeing myself on a screen?	• How would a virtual appointment affect you? • Would you be comfortable seeing yourself on a screen?
	Previous care	Experience of previous care	• Could my previous treatment have been managed successfully virtually?	• Do you think your previous treatment could been managed successfully virtually?
	Perceived requirements	The negotiated requirements of the session	• How can my problem be managed best?	• How can your problem be managed best?

Demands of care	Care requirements	The requirements of care	- What do I need to during my rehab? - Can I achieve this?	- What does your care require of you? - Can you achieve this?
	Social demands	The competing life demands that can interfere with healthcare.	- What other things do I need to do that might get in the way of a F2F or VC?	- What other things do I need to do that might get in the way of a F2F / VC?
	Consequences of choice	The impact of choice	- What do I need to do if I choose a VC?	- What do you need to do if you choose a face-to-face or a virtual appointment?
Capacity to allocate resources to care	Financial	The ability to free up financial resources	- What would the financial impact be for me if I choose a face-to-face or a virtual appointment?	- What would the financial impact be for you if you choose a face-to-face or a virtual appointment?
	Infrastructure	Access to material and informational resources	- Do I have access to what I need to have a face-to-face or a virtual appointment?	- Do you have access to what you need to have a face-to-face or a virtual appointment?

			- Do I understand how use what is needed for a virtual appointment?	- Do you understand how to use what is needed for a virtual appointment?
	Social capacity	Support available through social network	- Do I have anyone who could support me with a face-to-face or a virtual appointment?	- Do you have anyone who could support you with a face-to-face or a virtual appointment?
	Healthcare system	Sources of healthcare capacity	- How can my healthcare professionals support me to access my care with either a face-to-face or a virtual appointment?	- How can we support you to access your care with either a face-to-face or a virtual appointment?

Figure 7 Sensitising questions 1: Situation of Care

NHS Royal National Orthopaedic Hospital NHS Trust

London School of Hygiene & Tropical Medicine

NIHR | National Institute for Health Research

University of Southampton

Questions to help you decide if either a virtual or face-to-face appointment is best for you

Could my previous treatment have been managed successfully virtually?

Am I comfortable seeing myself on a screen?

What do I need from the clinic to support me with either virtual or face-to-face care?

How would a virtual appointment affect me?

How can my problem be managed best?

What do I expect?

@awgilbert11, @connectphd

For more information about the research please visit **www.theconnectproject.info**

Figure 8 Sensitising questions 2: Expectations of Care

Questions to help you decide if either a virtual or face-to-face appointment is best for you

Do I have anyone who can support me to attend a virtual or a face-to-face appointment?

Do I have the equipment I need for a virtual appointment?

Can I afford to travel to my appointment?

Do I know how to use the equipment I need for a virtual appointment?

What do I have available to me?

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Figure 9 Sensitising questions 3: Capacity to allocate resources to Care

Figure 10 Sensitising questions 4: Demands of Care

4.5.1 Results in context

Burden of treatment theory[51] and the cumulative complexity model[92] both focus on the relationship between the workload demands on the patient with the patients capacity to do the work. Our previous research[98] hypothesised that the work of being a patient influences preference; patients may prefer the least burdensome option when giving the choice between a F2F and VC.

This current paper extends our previous model of patient preferences adding in: the situation of care, patient's expectations of care and patients ability to allocate resources to care (see Figure 2). Some patients find the process of F2F attendance burdensome. Despite this, some of these patients preferred to receive hands on manipulation. Some patients were prepared to tolerate burden as part of a process that offered them F2F care they believed was superior to a VC. In addition, some patients perceived the consequences of choosing a F2F (or VC) would significantly impact on their overall experience of care, both positive or negative. Additionally, factors such as confidentiality in VC and trustworthiness[142] may influence expectations of care. The model within this paper clearly demonstrates additional factors relating to BoT are likely to influence their preference. The option that best meets patients' expectations of care influences preferences.

Some patients discussed the situational nature of their problem and how their preferences may have been different under different circumstances. This is in accord with our qualitative study of acceptability for rehabilitation consultations.[49] Greenhalgh et al[108] found that videoconferencing using SKYPE was useful to access hard to reach patients and that avoiding long journeys to access care was beneficial. Not travelling can reduce healthcare costs[143] and the need for family to accompany patients on their journey.[49] Patients without the support of their families in our study found this to be beneficial. Kaambwa et al[124] found that patients had strong preferences for VCs when their clinic was between 15-100km away and when their use reduced costs. The dynamics between the situation and the patient's capacity for care create a unique state of affairs for each patient at the time of being offered the choice between consultations. These factors directly influence the patients burden and expectations of care. Consideration of these factors, and identification of the option with the most utility to the patient, will influence preferences.

This study is separated from many others (e.g. in primary care[106] and psychiatry[144] studies) because orthopaedic rehabilitation often requires 'hands on' care which is not possible virtually. The lack of touch over VC can inhibit patients experience of receiving care, particularly when they desire it.[115] Patients in the PhysioDirect study of telephone consultations still wanted to have ‘proper’ F2F physio.[145] VC has been seen as ‘impersonal’[146] and can reduce emotional bonding between the patient and healthcare professional.[115]

A common theme in our data was the negative psychological impact some patients felt seeing themselves through a screen. This was in accord with a patient in the Jansen-Kasterink study[146] who reported: *‘I cannot imagine seeing myself on video, I already have trouble seeing myself in a picture’.* Some patients for whom this was not a problem, however, found that being in their own environment and avoiding travel made them feel more relaxed[108] which could in itself improve patient-healthcare professional relationships. If offered the choice of a F2F or VC, patients need to give consideration to the alternatives; the actions, the state of affairs and the consequences of choosing each alternative. The present research does not suggest how *much* the highlighted factors influences preferences or compete and compete with each other. This study will inform the design of a Discrete Choice Experiment, a deductive investigation to quantitatively measure how each factor influences preferences for patients in a pragmatic real-world scenario. A thorough understanding of the effect and influence of preferences will enable patient-centered service design.

4.5.2 Strengths and Limitations

The results of this study should be interpreted in light of their strengths and limitations. It was conducted at a single center and may not translate to other clinical areas. To overcome this, variation across participants was sought and attention focused towards more general factors to allow for application of these findings to other clinical settings.

The lead researcher (AWG) recruited patients via the treating clinicians. This could have led to recruitment bias. Clinicians could have interpreted the aims and objectives of the study in a different way than was intended. For instance, clinicians may have sought to speak to patients who were interested in VC and not attempt to recruit those who were not interested. Furthermore, clinicians explanation of the aims and objectives of the study may have influenced the views of potential patient participants. As such, the recruitment strategies may have led to bias through the selection of participants and the potential influence of participant viewpoints.

AWG is a healthcare professional within the centre which could have led to bias results through local familiarity. AWG had been based within the department for 8 years at the time of the research and had published on the use of VC. This may have led clinicians to believe that AWG was looking for favourable responses regarding VC. Furthermore, as a clinician within the department AWG may have had prior knowledge about departmental processes which could have led to leading conversations about aspects of rehabilitation within the semi-structured interviews.

Patients who had a previous existing relationship with AWG were excluded from the study as per the exclusion criteria. It was not possible, however, to exclude clinical staff, most of whom were known to AWG. This was taken into account in the data analysis through a process of defamiliarisation; attributions for each data point were orientated into a taxonomy to facilitate model development. *Whilst this helped with the data management and theorisation of data without the distraction of familiar data, this process may have interfered with the reflexivity of the researcher. Although the researcher kept a reflexive diary and tried to account for the relationship with the data, this ultimately could have led to bias.*

As an active clinician within the department, AWG was uniquely positioned to explore the research topic. Abduction embraces the role of the interpretant the theorise research data. A different researcher within this study would have led to contrasting interpretations and different results to those reported within this paper.

This research was conducted within the constraints and resources of a PhD. A pragmatic decision was made to decide on the sample size a-priori. Prior to the research starting, it was decided to recruit 2 patients and 2 clinicians for 'pilot' interviews and then recruit a further 20 patients and 20 clinicians. This number was selected to allow for a broad range of views within the scope and resources of a sub-study within a PhD project. As such, the approach was to collect data via semi-structured interview and undertake analysis at the end of the project. Had the analysis been undertaken at the same time as the interviews, different themes may have been identified and the data would have determined when to stop data collection. Furthermore, the interviews could have further probed the themes as they were identified to aid further characterisation.

4.5.3 Potential impact of Covid-19 pandemic on the future of virtual consulations

The empirical data collection for this research was conducted prior to the COVID-19 pandemic. The COVID-19 pandemic has accelerated the introduction of VC across healthcare. The rapid implementation of VC[31] may shape the future of this work in a way that was not previously anticipated. The COVID-19 'situation' has influenced an increased uptake of VC in practice. Whilst this research did not formally collect data regarding previous experience of VC (even in a different setting), future research should explore patient and clinician experience of using VC for healthcare consultations. Further research evaluating the use of VC during the COVID-19 pandemic will support future service redesign.

4.6 Conclusions

We conducted 44 qualitative interviews to gain a thorough understanding of the mechanisms that influence patient preference. Multiple factors were identified: the situation of care (the ways that patients understand and explain their clinical status, their treatment requirements, and the care pathway), the expectations of care (influenced by a patients desire for contact, psychological status, previous care and perceived requirements), the demands of care (of each patients respective social situation and the consequences of choice) and the capacity to allocate resources to care (the patient's ability to allocate resources to care; these include financial, infrastructural, social and healthcare resources). Factors may combine or compete with each other to influence preference. The patient's situation is dynamic and therefore preferences must also be dynamic. The formation of preference is cognitively demanding and sensitising questions may support patients to identify their preferred consultation format. This research illuminates the factors that appear to influence preference for patients. This is important for healthcare professionals; an understanding of preferences is essential to support the design of patient care pathways incorporating virtual consultations. The dynamic model presented here can be used to inform quantitative studies such as discrete choice experiments, and could act as a programme theory to inform future trials.

4.6.1 Ethics approval and consent to participate

Ethical approval was received for this study (Approval received 4th December 2018 from the South Central-Oxford C Research Ethics Committee [IRAS ID: 255172, REC Reference 18/SC/0663). All participants were provided with a participant information sheet and given at least 24 hours to consider the information and ask questions before being recruited into the study. All participants provided informed, written consent prior to enrolment.

4.6.2 Contributors

AWG wrote the paper and conceived the project with CRM, JJ and MS. CRM guided qualitative data collection. AWG conducted all the interviews. CRM assisted with data analysis, and with AWG developed the model. CRM, JJ and MS edited and critically revised the paper. All authors have read and approved the manuscript. AWG is the guarantor of the manuscript.

4.6.3 Acknowledgements

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Chapter 5 Patient preferences for use of virtual consultations in an orthopaedic rehabilitation setting: Results from a discrete choice experiment

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5.1 Abstract

Objective

Virtual Consultations may reduce the need for face-to-face outpatient appointments, thereby potentially reducing the cost and time involved in delivering health care. This study reports a discrete choice experiment (DCE) that identifies factors that influence patient preferences for virtual consultations in an orthopaedic rehabilitation setting.

Methods

Previous research from the Care in Orthopaedics, burdeN of treatmeNt and the Effect of Communication Technology (CONNECT) Project and best practice guidance informed the development of our DCE. An efficient fractional factorial design with 16 choice scenarios was created that identified all main effects and partial two-way interactions. The design was divided into two blocks of eight scenarios each, to reduce the impact of cognitive fatigue. Data analysis were conducted using binary logit regression models.

Results

Sixty-one paired response sets (122 subjects) were available for analysis. DCE factors (whether the therapist is known to the patient, duration of appointment, time of day) and demographic factors (patient qualifications, access to equipment, difficulty with activities, multiple health issues, travel costs) were significant predictors of preference. We estimate that a patient is less than 1% likely to prefer a virtual consultation if the patient has a degree, is without access to the equipment and software to undertake a virtual consultation, does not have difficulties with day-to-day activities, is undergoing rehabilitation for one problem area, has to pay less than £5 to travel, is having a consultation with a therapist not known to them, in 1 weeks' time, lasting 60 minutes, at 2pm. We have developed a simple conceptual model to explain how these factors interact to inform preference, including patients access to resources, context for the consultation and the requirements of the consultation.

Conclusions

This conceptual model provides the framework to focus attention towards factors that might influence patient preference for virtual consultations. Our model can inform the development of future technologies, trials, and qualitative work to further explore the mechanisms that influence preference.

5.2 Introduction

Virtual Consultations (VC) may reduce the number of face-to-face (F2F) outpatient appointments over the next 10 years.[4] VC has been shown to be acceptable to patients,[48] but F2F care is still seen as the 'gold standard'[147] and is generally preferred by patients.[148] The COVID-19 pandemic has shone a spotlight on the potential for VC to enable continuation of care, seeing telemedicine used 'like never before'[149] and there are examples of its rapid implementation.[31,150,151] VC can reduce the cost to providers of delivering health care and mean patients do not have to spend time and money travelling to F2F consultations.

Our previous study of the acceptability of VC for patients with shoulder instability[49] found that half of included patients preferred VC over F2F for their rehabilitation sessions. Preferences, however, were not static over time and were often dependent on what patients wanted from the consultation and the stage of the problem and treatment the patient was at. The Care in Orthopaedics, burdeN of treatmeNt and the Effect of Communication Technology (CONNECT) Project is a four-Phase investigation into patient preferences for virtual consultations in an orthopaedic rehabilitation setting.[97] The overall design of the CONNECT Project can be seen in Figure 11.

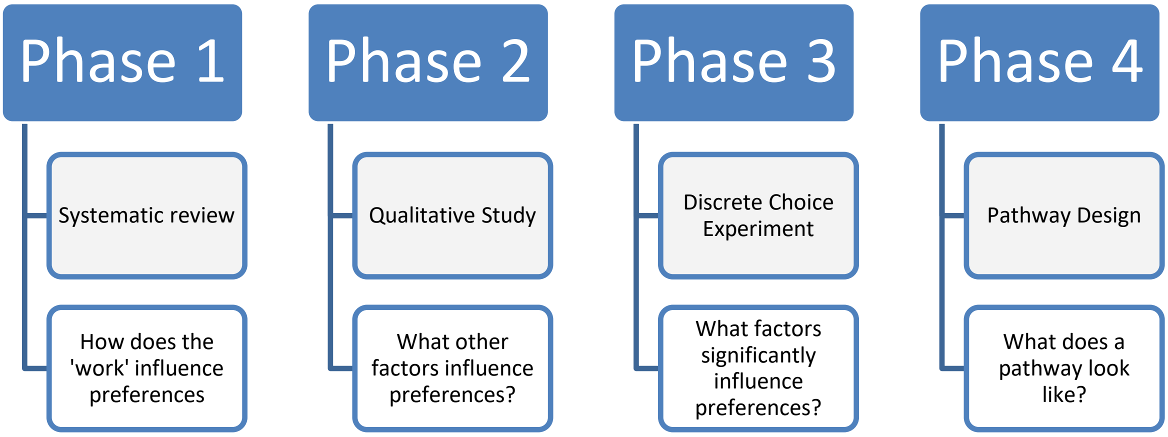

Figure 11 Overall design of the CONNECT Project

Previous CONNECT Project research indicates that the use of VC changes what is required of patients to participate with their care (Phase 1).[98] VC use required different processes (such as logging in and setting up software), different skills (communicating over a screen and self-assessing), different logistical requirements (not physically attending the consultation), time requirements (integrating the consultation in their lives), a different setting (creating space for virtual and physical rehabilitation), additional hardware and software and changes to interactions (due to an altered patient-clinician relationship).

We have also shown that use of VC impacts on patients' experiences of receiving care and identified factors that influence preference (Phase 2).[99] These factors include the situation of care (the clinical status, treatment requirements and the availability of health care to the patient), expectations of care (the patient's desire for physical contact, their psychological status and the impact of this across different care formats, their experience of previous care and the patient's perceived requirements), demands of care (the requirements of care, the competing life demands and the patients consequences of choice) and capacity to allocate resources to care (such as financial, material and informational resources, support available through their social network and sources of health care capacity). Large-scale quantitative studies have investigated preferences for VC at a population level,[152] at key stakeholder level[153] and with patients.[154] To our knowledge, no studies have investigated factors influencing patient preference for - or against - VC in an orthopaedic rehabilitation setting.

In the present study, preference is defined as a 'total subjective comparative evaluation',[5] which is a cognitive task whereby patients consider the alternatives and their consequences to determine the alternative which yields the most utility to them. It is assumed that a patient will subsequently *choose* the option that will provide the most utility.[5]

This paper reports Phase 3 of the CONNECT Project, a discrete choice experiment (DCE) designed to investigate the factors influencing preference for VC among patients attending orthopaedic rehabilitation. The purpose was to identify factors that significantly influence patient preference for or against VC in an orthopaedic rehabilitation setting. A secondary objective was to develop a conceptual model providing explanations for these observed mechanisms. This paper will inform Phase 4 of the CONNECT Project, which will design a model of care based on the preferences of patients.

The research question for this DCE is 'what are the factors that influence preferences for or against VC among patients attending orthopaedic rehabilitation?' Secondary questions investigate the relative importance of these factors, whether there are interactions amongst factors that influence individual preference and whether heterogeneity exists within the factors that influence preference.

5.3 Methods

The research intended to recruit participants from an NHS specialist orthopaedic hospital with sites in North and Central London and an NHS specialist hospital in Oxfordshire, UK.

Previous research from the CONNECT Project informed DCE development. The semi-structured interview guide to explore preferences in Phase 2[99] (see Appendix F on page 323 and Appendix G on page 329) was informed by Phase 1.[98] Twenty-two patients and 22 clinicians (13 physiotherapists, 9 occupational therapists) were interviewed during Phase 2.[99] From these interviews we identified factors that influenced preference. In addition, we explicitly asked participants to identify the factors they felt would be important to test in a DCE. These were compiled and split into two categories: pathway factors (features of the consultation) and patient demographic factors (features of the patient). This DCE was intended to be pragmatic and inform changes to clinical practice. Priority was therefore given to those pathway factors most amenable to manipulation in practice within the choice experiment. The final selection of pathway factors was supported by the Management Team of the host NHS organisation. One example of an attribute that was included is the 'time of day' of the appointment, which can be set throughout the day. For the purposes of this DCE, *it was* decided to set times that provided a spectrum across the day. *Although 8am, 12pm and 2pm appointments were routinely used within the department, the addition of 6pm provided insight into how people prefer to attend 'later' appointments in the day. This was deemed as important to NHS managers as it could have provided useful information to support the extension of the working day by offering later appointment times.* Another example is the duration of the appointment, derived from clinical experience and covering the spectrum of long (60 minute) and short (15 minute) appointments. *This was important to NHS managers, because although the department only offered 30 minute and 60 minute appointments, it was recognised that patients occasionally require shorter appointments. From an economic perspective, it was also seen as beneficial to offer extremes of choices (i.e. early morning and later evening; short and long appointments), whereas from an NHS manager perspective, the DCE needed to be contained to a questionnaire that could likely inform practice. For instance, it was viewed as highly unlikely to offer a two hour appointment and although this would have provided further insights into length of appointment this was not viewed as feasible.* One *further* attribute that was excluded was a proxy for 'willingness to pay', which was the willingness to compromise outcomes by having a virtual appointment, as it was felt that it would be unethical to pose such a question to patients who were about to undergo rehabilitation.

All demographic variables that were identified as important were included in the questionnaire to provide insight into the factors that influence preferences for patients. The participant information sheet and discussions at the recruitment stage made it clear to patients that completion of the DCE would not affect their care and that virtual appointments were not actually available for use. Factors of interest, mapped to the factors identified in Phase 2, can be seen in Table 12 below.

The final wording of the DCE questions and survey design were developed with support of the CONNECT Project Patient and Public Involvement Steering Group (PPISG) during a scheduled meeting in March 2019 (2 members of the public, 3 patients, 3 hospital staff) and then with an additional PPISG patient member in August 2019, prior to the initial pilot.

Table 12 Phase 2 factors mapped with Phase 3 DCE factors of interest

Theme Phase 2	Factor	Description	DCE factors of interest
Patient Factors	Demographic factors	Routinely available data accessible to health care staff	Age Gender Ethnicity Main language
Situation of care	Clinical status	The health issue the patient experiences, its stability, reversibility, and its impact on the patient in conjunction with other issue.	The health issue the patient has Symptoms the patient has Level of mobility Previous surgery
	Treatment requirements	The treatment and management of the patient's health issue. The restrictions imposed on the patient.	Symptoms the patient has Level of mobility Previous surgery
	Care pathway	The availability of health care to the patient	Number of previous sessions Frequency of previous sessions
Expectations of care	Desire for contact	Whether the patient/health care	Previous experience of rehabilitation

		professional believes the F2F is more of a capable method of care delivery than VC.	
	Psychological status	The psychological status of the patient and the impact of this on care across different delivery formats.	Relationship with current therapist
	Previous care	Experience of previous care	Previous experience of rehabilitation
	Perceived requirements	The negotiated requirements of the session	The health issue the patient has Symptoms the patient has
Demands on the patient	Care requirements	The requirements of care	Type of rehabilitation
	Social demands	The competing life demands that can interfere with health care	Other commitments
	Consequences of choice	The impact of choice	Length of time to travel Type of rehabilitation
Capacity to allocate resources to care	Financial	The ability to free up financial resources	Patient's academic qualifications (socioeconomic proxy) Cost of travel
	Infrastructure	Access to material and informational resources	Transport to clinic Ability to use phone/video call Access to equipment Willingness to download additional software
	Social capacity	Support available through social network	Requirement of a chaperone to travel

	Health care system	Sources of health care capacity	Transport to clinic Patient and hospital's main language

5.3.1 Instrument

The DCE was designed in light of best practice.[155] The initial discussion and pre-pilot suggested that the most realistic format would be one where hypothetical scenarios are presented to patients, who then opt to have them as either VC or F2F consultations. Given our attributes (i.e. 2 x 3^2 x 4 with a full factorial of 72 combinations), an efficient fractional factorial design with 16 choice scenarios was created using the NGENE software that identified all main effects and partial two-way interactions. D-efficiency of the optimal design (where the higher the percentage is, the higher the statistical efficiency)[105] was 84%, implying that the relative efficiency of our design compared to the full factorial was good. To reduce the impact of cognitive fatigue on patients the design was split into two blocks so that each participant was required to answer only eight scenarios in addition to demographics. The final DCE design is demonstrated in

Table 13 on page 112. Three pilots were undertaken to refine the questionnaire, to ensure comprehension and to develop the analytical model. A full vector of demographic variables was collected within the DCE (the ‘Block 1’ version of the questionnaire can be viewed in Appendix J on page 347).

Table 13 Final DCE Design

Choice Set	Therapist	When	Duration	Time of day	Block
1	Old	1 Week	15 mins	2pm	Block 2
2	Old	1 Week	30 mins	8am	Block 2
3	Old	1 Week	60 mins	2pm	Block 2
4	Old	4 Weeks	15 mins	8am	Block 1
5	Old	4 Weeks	60 mins	6pm	Block 1
6	Old	12 Weeks	15 mins	12pm	Block 1
7	Old	12 Weeks	30 mins	12pm	Block 2
8	Old	12 Weeks	60 mins	6pm	Block 2
9	New	1 Week	15 mins	6pm	Block 1
10	New	1 Week	30 mins	2pm	Block 1
11	New	1 Week	60 mins	12pm	Block 1
12	New	4 Weeks	15 mins	12pm	Block 2
13	New	4 Weeks	30 mins	8am	Block 1
14	New	4 Weeks	60 mins	8am	Block 2
15	New	12 Weeks	15 mins	6pm	Block 2
16	New	12 Weeks	30 mins	2pm	Block 1

The participant information sheet informed patients that they would choose whether they would prefer F2F or VC in each of the eight hypothetical scenarios, then provide information about themselves in the following questions. In summary, Part 1 consisted of the choice experiment, Part 2 consisted of demographic questions, Part 3 consisted of questions related to VC and access to resources and competing demands, Part 4 consisted of questions related to clinical care and Part 5 consisted of questions about travelling to the clinic.

5.3.2 Participants

Sample size depends on the number of choice tasks, the number of alternatives and level of effects needed. Using Johnson and Orme's formula,[156] a total sample size of 125 participants was deemed to be efficient. Planned recruitment therefore was 100 patients, meeting the inclusion criteria, per block, per site, to allow for comparisons between sites.

This study sought to recruit patients over the age of 18 with experience of an orthopaedic/musculoskeletal condition attending recruitment centres for occupational therapy or physiotherapy. Patients needed to understand and speak English or a language covered by the hospital's interpreter service, and provide informed written consent to enter the study. Patients without the capacity to consent were ineligible, as were patients suffering from disorders other than orthopaedic as the primary cause (e.g. respiratory, neurological or oncology disorders).

The study was advertised using a pop-up banner in each respective department. Patients were encouraged to discuss the study with their treating health care professional or approach the researcher directly. Patients were provided with a participant information sheet and were eligible to join the study after providing written consent. Patients were given the option of completing the DCE in a paper format (using a print-out of the questionnaire, with a clipboard and pen provided. The researcher could act as a scribe for anyone who had difficulty) or electronic format (online, via SurveyMonkey, where patients could scan a QR code and complete on their own device or using a Hospital tablet computer). Paper copies were transferred to electronic form at a later date.

5.3.3 Data analysis

Data analyses were conducted in R v3.5.1 (R Core Team 2013). Initial reporting of data provided descriptive statistics for demographic variables and observed choices (virtual versus F2F) by choice set. Binomial logistic regressions were undertaken with attribute levels entered as covariates to explain individual choices for VC or F2F consultations. The following process was followed:

1. Binomial logistic regression investigating DCE attributes' main effects.
2. Adding selected interactions to specification
3. Adding full vector of demographic variables to specification.
4. Adding only significant demographic variables in specification.
5. Using the estimated coefficient from our preferred model specification, we calculate predicted probabilities of specific hypothetical scenarios of interest.

5.3.4 Ethical considerations

Ethical approval for the qualitative interviews informing the DCE design was sought for Phase 2 (approval received on 4 December 2018 from the South Central-Oxford C Research Ethics Committee (IRAS ID: 255172, REC Reference 18/SC/0663) and ethical approval for DCE delivery was sought for Phase 3 (approval received on 18 October 2019 from the London-Hampstead Research Ethics Committee (IRAS ID: 248064, REC Reference 19/LO/1586). All participants were approached within the recruiting therapies' departments and provided informed written consent prior to completion of the DCE.

5.4 Results

Recruitment commenced in January 2020. Forty-nine patients completed the first pilot, 17 the second pilot and 16 the third pilot before the DCE was finalised. Sites A and B in London were required to cease recruitment due to COVID-19 by Friday 13th March 2020 - potential patients were thereafter required to undertake virtual consultations, as reported elsewhere.[31] The study was closed at Site C in Oxfordshire at the same time. Final recruitment numbers are demonstrated in Table 14.

Table 14 Recruitment numbers to final DCE

Site	Block 1	Block 2
A	128	61
B	88	0
C	3	0

As full DCEs were required (paired questionnaires from 'Block 1' and 'Block 2') only 61 questionnaires (122 patients) were used for analysis at site A. The first 61 questionnaires were selected. This therefore led to 976 choice sets. No analysis could be conducted for sites B and C as no 'Block 2' data were collected.

As the number of recruited participants were less than planned, and the relative oversampling of Block 1 compared to Block 2, we undertook three additional, previously unplanned, checks of validity:

1. Test for scale differences between the two blocks
    - Neither the baseline nor the preferred model suggested scale issues.
2. A random sample of 61 participants was chosen and matched to Block 2
    - Mean coefficients were close to our presented coefficients with similarities being close to the statistically significant coefficients, with no differences relating to sign and significance. This is evidence for a lack of bias due to consecutive sampling of block 1 data.

3. A comparison of the estimation of results between Site A and B for Block 1 data alone to test for validity between sites.
    - The signs and significance of results were deemed to be consistent across sites A and B.

The average age of included patients was 51.6 years (range 18-90 years). Seventy-nine patients were female, 42 were male, 1 nonbinary. 256 choice sets (26%) were in favour of VC compared to 720 (74%) in favour of F2F consultations.

5.4.1 DCE outputs

The full vector of demographic variables is available to view in Appendix J on page 347. Full DCE output for all variables is available in Appendix K on page 369. Table 15 on page 113 demonstrates the outputs from the DCE with the retained significant factors, along with the attribute main effects:

Table 15 DCE estimation of pathway factors and demographic variables influence on preference

Variable (reference levels in parenthesis) Level in the model	Estimate (z value)	Standard error	P value	Odds ratio
Intercept	-0.162 (-0.451)	0.36046	0.652	
Therapist (Old)				
New	-0.311 (-1.685)	0.18476	0.092	0.73
Time to appointment (4 Weeks)				
1 Week	-0.021 (-0.082)	0.26603	0.935	0.98
12 Weeks	0.305 (1.047)	0.29177	0.295	1.36
Duration of appointment (15 minutes)				

30 mins	-0.887 (-3.800)	0.23337	<0.000 ***	0.41
60 mins	-1.661 (-7.331)	0.22651	<0.001 ***	0.19
Time of day of appointment *(*12 noon)				
8:00 am	1.096 (3.755)	0.29193	<0.001 ***	2.99
2:00 pm	0.271 (0.950)	0.28555	0.342	1.31
6:00 pm	0.886 (3.353)	0.26414	<0.001 ***	2.42
Highest level of academic qualification (Degree)				
No degree	0.430	0.18835	0.022 *	1.54

	(2.284)			
Access to equipment and software to phone or video call your therapist? (Yes)				
Do not have access to equipment	-3.530 (-5.867)	0.60166	<0.001 ***	0.03
Difficulty with day-to-day activities (Yes)				
No	-0.960 (-4.975)	0.19290	<0.001 ***	0.38
Do you have other conditions that restrict your mobility? (Yes)				
No	0.954 (4.728)	0.20177	<0.001 ***	2.60
How much did your return journey to the clinic cost? (Less than £5)				
More than £5	0.524 (3.130)	0.16734	0.002 **	1.69

The factors included within the DCE demonstrate the odds of each respective factor in relation to their reference level. If the coefficient value is a positive number, virtual consultations are preferred for that factor level in comparison to the reference level (for example, for time of day, if an appointment was offered at 8:00am the positive coefficient (1.096) indicates that VC would be preferred relative to the response for an appointment at 12:00 noon). In contrast, where the coefficient value is negative F2F consultations are preferred.

The results reported in Table 17 indicate that patients' preferences were strongly influenced by two of the attributes included in the experiment (duration and time of day of appointment) but showed less influence for the other two attributes. Patients preferred F2F when the appointment was with a new therapist or in the very near future (1 week), preferring VC when the appointment date was more distant (12 weeks) - although these effects were not statistically significant. There was a consistent, statistically significant ($p<0.001$), pattern in favour of F2F with increasing duration of appointments (30 and 60 minutes compared with the reference level of 15 minutes). Patients offered early (8am) or late (6pm) appointments were more likely to choose VC, compared with midday (12pm) – with odds of 2.99 and 2.4 times respectively.

Among the respondent and demographic variables included in the model two were significantly associated ($p<0.001$) with preference toward F2F consultation. These were patients who did not have access to equipment to make video calls (odds ratio=0.03) and those who had difficulty with day-to-day activities (odds ratio=0.38). Three variables significantly associated with preference toward VC were the presence of multiple musculoskeletal problems that restrict mobility (odds ratio=2.60, $p<0.001$), having paid more than £5.00 to attend the appointment (odds ratio=1.69, $p=0.002$) and not having a degree (odds ratio=1.54 $p=0.022$).

5.4.2 Predicting probability of outcome

Using the 'predict' function in R we found a 59% probability a patient would choose VC in scenario 1 and a 7% probability a patient would choose VC in scenario 2, based only on the study attributes. We chose these scenarios to include those combinations that were most (Scenario 1) and least (Scenario 2) favourable to choosing VC. These are shown in Table 16 on page 117.

Table 16 Predicted probability of outcome for pathway factors

Scenario 1	Scenario 2
• Appointment with a therapist not known to the patient • Appointment in 12 weeks’ time • Appointment to last 15 minutes • Appointment at 8am	• Appointment with a therapist known to the patient • Appointment in 1 week’s time • Appointment to last 60 minutes • Appointment at 2pm
Value = 0.594	Value 0.074

Incorporating demographics into the scenarios shown in Table 17 shows there is an 89% probability a patient would choose VC in scenario 3 and a less than 1% probability a patient would choose VC in scenario 4 based on these data. Again, these scenarios combinations that are more favourable (Scenario 3) and less favourable (Scenario 4) to choosing VC.

Table 17 Predicted probability of outcome for pathway factors and demographics

Scenario 3	Scenario 4
Pathway factors *The appointment is:* • with a therapist known to the patient • in 12 weeks' time • to last 15 minutes • at 8am Demographic factors *The patient:* • does not have a degree • has access to the equipment and software to undertake a virtual consultation • has difficulties with day-to-day activities • is undergoing rehabilitation for multiple health issues • has to pay more than £5 for their return journey	Pathway factors *The appointment is:* • with a therapist not known to the patient • in 1 week's time • to last 60 minutes • at 2pm Demographic factors *The patient:* • has a degree • does not have access to the equipment and software to undertake a virtual consultation • does not have difficulties with day-to-day activities • is undergoing rehabilitation for one health issue • has to pay less than £5 for their return journey
Value = 0.8996	Value = 0.0005

5.5 Discussion

We developed a choice experiment from our qualitative study of preference for VC. The experiment was developed and conducted before the UK's COVID-19 lockdown - where remote working was not ubiquitous – and patients may have been expected to have expectations of, and strong preferences in favour of, F2F consultation. This may be reflected in the fact the predicted probability of choosing VC, using combinations of consultation characteristics most favourable to VC, is around 60%. Inclusion of patient, demographic and other factors, such as difficulty with day-to-day activities or cost of travel, can further influence preference in favour of VC.

The data we have been able to analyse are from a single site and may not be generalisable. However, the findings from the DCE provide a starting point to consider insights into factors that might influence preferences in other settings. We undertook an analytical process whereby factors were thematically organised into constructs. This enabled characterisation of constructs in a manner not specific to any one health care setting, which should be transportable to other areas of health care.

Figure 12 on page 120 presents our proposed set of constructs that influence preference for VC: these are 'patients access to resources', 'context for the consultation' and 'requirements of the consultation.' 'Patients access to resources' refers to socioeconomic and equipment factors (access to, and willingness to engage with, technology). 'Context for the consultation' includes pathway-related factors (such as the length and timing of the appointment) and symptom-related factors (such as patient symptoms and the effect of travel on these). 'Requirements of the consultation' cover both the objectives of the consultation, and interaction factors (whether the patient feels the interactions required to fulfill the objectives of a consultation can be achieved). The model indicates how these factors, and their interaction, influence preferences.

Key (Figure 12)

(a) = interactions between 'Patients access to resources' and 'Context for the consultation'
(b) = interactions between 'Patients access to resources' and 'Requirements of the consultation'
(c) = interactions between 'Context for the consultation' and 'Requirements of the consultation'

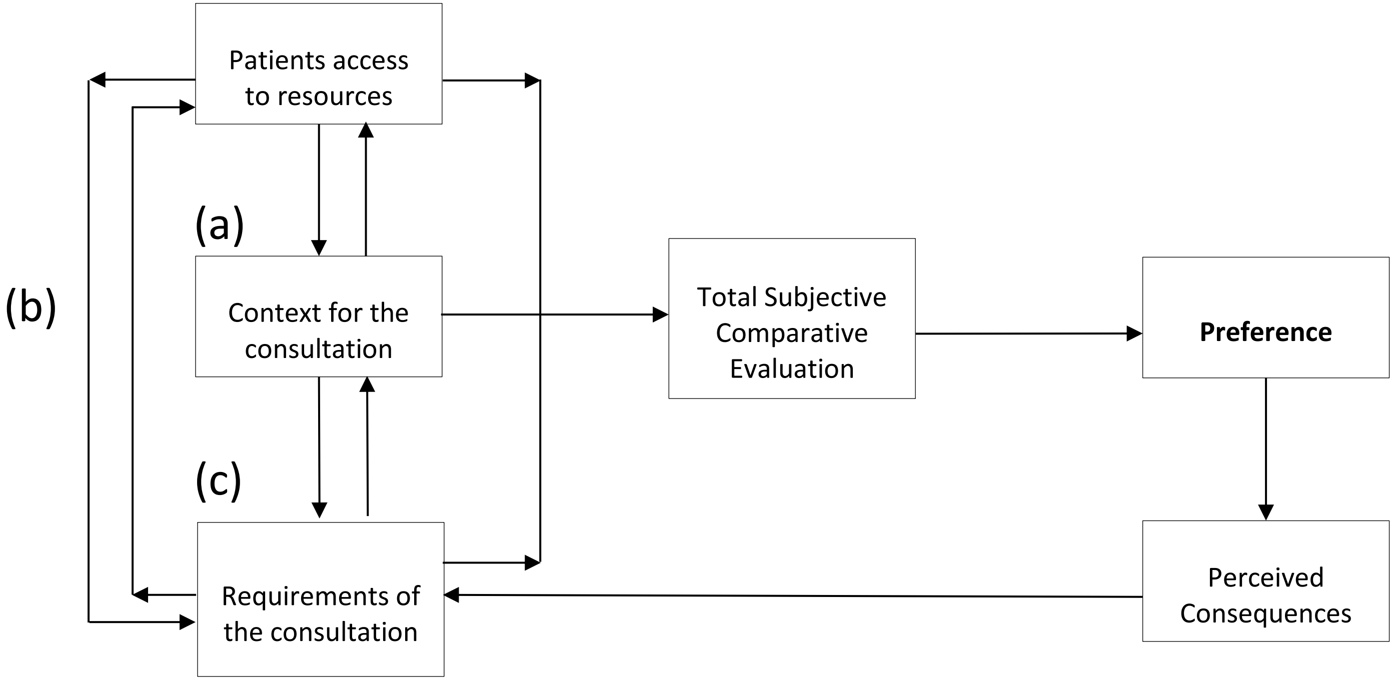

Figure 12 Interactions between factors that influence preferences for videoconferencing consultation

Patients access to resources and context for the consultation interact (labelled (a) in Figure 11) to the extent that socioeconomic status determines patients' ability to engage with care. Patients' ability to access and engage with the technology will provide the starting point to undertake a virtual consultation, which may reduce the physical burden of travel and consequences on symptoms for the patient. The financial consequences of travel (cost, implications of taking time out of other activities, such as employment) will differ depending on each patient's circumstances and may be affected by the time of day of the appointment (e.g. travel during rush hour is likely to take longer and cost more, travel during the middle of the day may impose less on other activities). The financial burden imposed on patients may be *worth* it if the appointment is longer.

Interactions between patients access to resources and requirements of the consultation (labelled (b) in Figure 11) occur as patients' ability to access and use the equipment determines whether the consultation objectives can be fulfilled. Trade-offs may take place between the ability to meet the requirements of the consultation and the socioeconomic consequences of choice. These financial implications will be dependent on the patient's structural position.

Interactions between the context for the consultation and requirements of the consultation (labelled (c) in Figure 11) derive from the fact that consultation objectives are dynamic and are informed by the clinical context and suitability of the pathway. Consultation objectives may determine the suitability of each form of consultation delivery. These may be mediated by the clinical context of the patient and the ability of the patient and clinician to work together to meet the requirements of the consultation.

Each of these factors influence preference as individuals consider the option that yields them maximum utility. Preferences inform choice in favour of VC or F2F. The choice of a particular consultation format has consequences[98] that impact on the factors we have identified.

Financial burden of time and travel has been found to be a particular strain for patients with multimorbidity, especially those with deprived socioeconomic status.[157] Our previous work[99] found that some patients reported having to take unpaid leave to attend appointments, whilst others were fearful of losing their jobs. Kalleberg[158] highlighted how economic vulnerability extends to the level and stability of compensation, earnings and leave options, while Cochrane and McKeown[159] found that 25% of females and 42% of males did not receive paid time off work.

Patients with a degree qualification preferred F2F over VC care. A report[160] concluded that both women and men with a degree are likely to have higher lifetime earnings than women and men without a degree (£252,000 more and £168,000 more respectively). The *type* of job an individual has may be dependent on employment status and those with lower education (up to A-Level in the United Kingdom) are over-represented in 'zero hours' contracts[161] and therefore unable to take paid leave for medical appointments. Socioeconomic factors may constrain choice.

Short appointment times are challenging.[162] Within our DCE we offered a mixture of appointment lengths: 15 minutes, 30 minutes and one hour. Patients in this choice experiment preferred to travel to undergo F2F appointments for longer sessions whereas VC was preferred for shorter sessions. This may be in part due to patients' expectations of receiving hands-on treatment, which may take longer than a purely conversational style appointment.

Time of day of the appointment was a significant factor in our DCE. Patients appreciate flexibility of treatment pathways.[162] Travelling for a F2F was favoured during the middle of the day (12 noon or 2pm) compared to 8am or 6pm in our study. Travel times may be longer during 'rush hour' which could increase discomfort for those suffering with pain as they are pushed beyond their travel limits, which they might 'pay' for at a later time.[163] Furthermore, patients in our study who had trouble with day-to-day tasks or multiple problems preferred virtual consultations. This may be, in part, due to the challenges of travel.

VC may pose challenges by altering how patients and clinicians interact and may impact on the flow of the consultation.[164] Potter[165] identified patient perspectives on the interpersonal skills that makes a good physiotherapist (body language, demonstration of empathy, making eye contact and speaking directly to the patient), some of which may be affected by VC. Furthermore, skills such as listening, encouragement, confidence, being empathetic and friendly, and nonverbal communication[166] might be impeded using VC. The DCE indicated that patients preferred a F2F appointment when seeing clinicians not known to them, although this finding was not statistically significant (p=0.1). Some patients may require hands-on care, this will also inform patient preference for or against VC.

5.6 Limitations

There are four main limitations in this study. First, the initial factors were developed abductively[95] during two previous studies, and other factors may have been identified in our earlier work through use of other means of analysis. A limited number of care pathway factors were amenable to manipulation in our choice experiment and we therefore chose to focus on pathway factors that could be influenced. Had we investigated alternative demographic variables the outputs of the DCE may have provided additional insights into the weight and strength of their influence on preference.

Second, the pragmatic nature of this study may have affected the sample. We recruited patients as they attended rehabilitation appointments at their respective NHS hospitals, but it was not always possible to recruit patients due to competing demands on the research team, and thus some patients might have been missed. Although we included the first 61 participants from Block 1 in site B, our retrospective random sampling of Block 1 data demonstrated a lack of recruitment bias from these repeated estimations. Sampling, considering an equal proportion of age, gender, and ethnicity, may have gleaned more data specifically relating to these factors. Although we have drawn conclusions relating to finances and socioeconomic status within this study, level of education was used as a crude socioeconomic proxy.[167] Further questions into household income and type of job may have gleaned more information. However, we agreed during the piloting stage that asking patients multiple questions about their socioeconomic status may have made some patients uncomfortable.

Third, there was the impact of COVID-19 on our sample. The design of the study required that 125 patients were recruited. However, it was cut short due to COVID-19, as the host site stopped routine F2F contacts. Data collection was abandoned after 61 patients from each block were recruited at only one site (122 patients in total). Further data collection upon re-opening of outpatient clinics was not appropriate due to the potential contamination of viewpoints from patients who had been required to use VC during the pandemic. Our small eventual sample size could affect generalisability of findings and hence we suggest caution in extrapolating these. Within our study, several demographic factors were not statistically significant, including patient age, gender, ethnicity, whether they speak English as a first language and the type of transport taken to get to the appointment. More participants may have yielded different results.

The impact of COVID-19 has led to rapid uptake[31] and interest in VC in practice. This research provides a baseline of pre COVID-19 preferences prior to the pandemic. It may be that the constructs offered, particularly structural factors - such as willingness to engage with technology - will be different because of the pandemic. Repetition of this study may illuminate the influence of COVID-19 on preferences. An understanding of preferences by health care clinicians, managers and policy makers will assist in supporting the design of patient centred care pathways.

Fourth, we have offered theory as to how these factors may influence preference. Further qualitative research investigating underlying reasons behind preferences may provide a stronger basis for theorisation. The results of this work provide a framework for further investigation into clinical prediction models. Further mixed methods research will assist with the development of tools to support decision making at a clinical level.

5.7 Conclusions

We have successfully designed and conducted a DCE that investigated the trade-offs between pathway factors for patients attending orthopaedic rehabilitation appointments at a tertiary orthopaedic NHS hospital. In addition, we have investigated a vector of demographic variables to understand how these patient demographics influence preferences. A number of factors have been identified, including patients access to resources, the context for the consultation and the requirements of the consultation. These factors have informed the development of an analytical model that can be used to predict the probability of a patient preferring either F2F or virtual consultations. We used a simplified conceptual model to explain how these factors interact to inform preference.

This simplified model has been reduced to its most basic form to allow for transportability to other settings. This conceptual model provides the framework to focus attention towards factors that might influence preference. In addition, the model can inform the development of future technologies, trials, and qualitative work to further explore the mechanisms that influence preference.

5.8 Acknowledgements

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5.9 Author Contributions

AWG wrote the paper and conceived the project with CRM, EM, JJ and MS. AWG designed the study with support from EM and JJ. AWG led the data collection with support from JJ. AWG completed the data analysis with support from EM and JJ. CRM, EM, JJ and MS edited and critically revised the paper. All authors have read and approved the manuscript. AWG is the guarantor of the manuscript.

5.10 Ethics Statement

Ethical approval for the qualitative interviews informing the DCE design was sought for Phase 2 (approval received on 4 December 2018 from the South Central-Oxford C Research Ethics Committee (IRAS ID: 255172, REC Reference 18/SC/0663) and ethical approval for DCE delivery was sought for Phase 3 (approval received on 18 October 2019 from the London-Hampstead Research Ethics Committee (IRAS ID: 248064, REC Reference 19/LO/1586). All participants were approached within the recruiting therapies' departments and provided informed written consent prior to completion of the DCE.

Chapter 6 Impact of COVID-19 on the thesis

The first two CONNECT Project papers, reported in Chapter 3 on page 33 and Chapter 3 on page 61 were both published in BMJ Open[98,99] and completed in accordance with the published protocol.[97] On the 5th March 2020, the Royal National Orthopaedic Hospital (RNOH) sent an internal communication email to all RNOH staff that stated a target had been established for face-to-face consultations to reduce to less than 20%. This target, to be achieved by the 16th March 2020, was set to ensure social distancing requirements due to COVID-19 were met. All staff were instructed to triage their patients to F2F consultations only if their clinical situation demanded a physical appointment. All other appointments were required to be conducted virtually, via telephone or 'Attend Anywhere'. The third CONNECT Project paper[100] was terminated on the 6th March 2020 due to the COVID-19 pandemic; there was not enough data collected from the central London site and the Oxfordshire site to be included in the data analysis.

During this time, I paused my PhD research and I returned to clinical practice at the RNOH, where I supported the accelerated implementation of VC. I had my first meeting with the 'non-face-to-face action group' (a multidisciplinary team of healthcare professionals who were assembled to support the implementation of VC across the Stanmore and Bolsover St sites at RNOH) on the 10th March 2020. I contributed clinical and academic research expertise to the team, with awareness of implementation science theory and recent insights about patient preferences from the first three papers from my PhD. The results of the accelerated implementation are described in a paper I published with RNOH colleagues that outlined the results[31], which is included in Appendix A on page 279. Our reflections on the initiative were published in a commentary of our leadership lessons[96] is included in Appendix B on page 299. Whilst these clinical service implementation papers were not planned PhD papers, they are included in the thesis as they provide useful context for the later stages of the research.

When I returned to my PhD in June 2020 I conducted an additional qualitative study, reported in Chapter 7 on page 133 that investigated the results of the DCE. In addition, it investigated how COVID-19 shaped patient preferences for VC and it is an addition to the research outlined in the protocol. Phase 4 deviated from the protocol as it was an evaluation of patient, clinician, and managers experiences of the accelerated implementation of VC due to COVID-19, rather than the pilot of a theoretical model of care. Instead, the theoretical model of care was illustrated within the discussion section in Figure 16 on page 234.

Chapter 7 A qualitative investigation into the results of a Discrete Choice Experiment and the impact of COVID-19 on patient preferences for virtual consultations

This paper has been published in Archives of Physiotherapy and is included as a 'published version'. The full reference is: Gilbert AW, May CR, Brown H, Stokes M, Jones J. A qualitative investigation into the results of a discrete choice experiment and the impact of COVID-19 on patient preferences for virtual consultations. Archives of physiotherapy. 2021 Dec;11(1):1-3. The formatting, spelling, and referencing for this paper are presented according to the journal's style requirements. In line with the Creative Commons license under which this paper was published, and the publisher's rights and permissions for open access publications, no additional permissions are required to include this article in this thesis as long as the appropriate citation is made.

7.1 Abstract

Objectives

To conduct a qualitative investigation on a subset of participants from a previously completed Discrete Choice Experiment (DCE) to understand why factors identified from the DCE are important, how they influenced preference for virtual consultations (VC) and how COVID-19 has influenced preference for VC.

Methods

A quota sample was recruited from participants who participated in our DCE. We specifically targeted participants who were strongly in favour of face-to-face consultations (F2F - defined as choosing all or mostly F2F in the DCE) or strongly in favour of virtual consultations (VC - defined as choosing all or mostly VC consultations in the DCE) to elicit a range of views. Interviews were conducted via telephone or videoconference, audio recorded, transcribed verbatim and uploaded into NVIVO software. A directed content analysis of transcripts was undertaken in accordance with a coding framework based on the results of the DCE and the impact of COVID-19 on preference.

Results

Eight F2F and 5 VC participants were included. Shorter appointments were less ‘worth’ travelling in for than a longer appointment and rush hour travel had an effect on whether travelling was acceptable, particularly when patients experienced pain as a result of extended journeys. Socioeconomic factors such as cost of travel, paid time off work, access to equipment and support in its use was important. Physical examinations were preferable in the clinic whereas talking therapies were acceptable over VC. Several participants commented on how VC interferes with the patient-clinician relationship. VC during COVID-19 has provided patients with the opportunity to access their care virtually without the need for travel. For some, this was extremely positive.

Conclusions

This study investigated the results of a previously completed DCE and the impact of COVID-19 on patient preferences for VC. Theoretically informative insights were gained to explain the results of the DCE. The use of VC during the COVID-19 pandemic provided opportunities to access care without the need for face-to-face social interactions. Many felt that VC would become more commonplace after the pandemic, whereas others were keen to return to F2F consultations as much as possible. This qualitative study provides additional context to the results of a previously completed DCE.

Key messages

What’s already known about this topic?

- The use of virtual consultations increased due to the COVID-19 pandemic.
- Several factors have previously been shown to influence patient preferences for virtual consultations

What does the study add?

- This study provides theoretically informative insights to explain the results of a Discrete Choice Experiment
- This study highlights the impact of COVID-19 on patient preferences for virtual consultations.

7.2 Introduction

The UK's National Health Service (NHS) Long Term Plan[4] sets out a policy agenda of mainstream digitally enabled care. Virtual Consultations (VC - either a real-time phone or a video consultation) have been suggested to reduce up to a third of outpatient appointments and save 'over £1billion a year'[4]. Benefits of VC also include saving patients time, convenience and freeing up healthcare professional time. The COVID-19 pandemic has accelerated the introduction of VC into clinical practice[31] with many organisations working hard to introduce VC.[96] Technology has taken a 'central role'[168] in healthcare following a 'big bang' change in technology driven work practices.[169] COVID-19 has brought about changes in the healthcare landscape in line with policy agenda in the NHS.[4]

Virtual physiotherapy has seen an increase of interest following the pandemic. Prior to COVID-19, virtual physiotherapy was seen to have a number of advantages, including increased flexibility, accessibility and reduced costs.[19] Digitally enhanced outpatient care has been labelled as a positive legacy of COVID-19, with the use of VC opening the door to remote working, remote assessment, remote monitoring and rehabilitation.[170] Outpatient physiotherapy services are now seen to have the opportunity to use blended digital approaches with traditional face-to-face (F2F) appointments, to suit the needs of patients, in an individualised manner.[171] Although VC was embraced during the pandemic, less than half of clinicians in a cross-sectional survey believed telehealth was as effective as F2F care.[172] The development of effective, patient centered, accessible, equitable and flexible patient care pathways has been cited as an important ambition.[173] An understanding of patient preferences is essential to the design of such innovative pathways in physiotherapy.

Preferences can be defined as a 'total subjective comparative evaluation.'[5] Preferences are the result of a cognitive task whereby individuals consider the alternatives and their consequences to determine the option or action which yields the greatest utility (or benefit) to them. Rational preference theory assumes that the individual will subsequently choose the option which benefits them the most.[5]

The CONNECT Project[97] is series of mixed methods studies investigating patient preferences for VC and is split across four Phases. In Phase 1, a systematic review was conducted that investigated how the work of being a patient influences preferences for VC.[98] Phase 2 was a qualitative study that investigated the various factors that influence preferences for VC. Phase 3 extended this work through a discrete choice experiment (DCE)[100]; a deductive investigation to test the strength of individuals characteristics and demographic factors and their relationship with preference for VC. Our previous DCE was terminated prematurely due to COVID-19 and we are therefore treating the results as indicative rather than absolute as the required number of patients were not recruited to enable definitive conclusions to be drawn. The results of the DCE suggest that people who prefer VC are: more likely to have access to the equipment required to undertake a VC and to have difficulty with activities of daily living; less likely to have resources to accommodate time and travel and to be educated to degree level. Soon after the termination of the DCE, there was an organisational restructuring to introduce virtual consultations due to COVID-19[31] and a qualitative investigation is needed to investigate the impact of COVID-19 on preferences and provide additional context to the results of the DCE.[100]

The primary objective of the present study was to conduct a qualitative investigation on a subset of DCE respondents to understand why factors identified from the DCE are important, and how they influence preference for VC. A secondary objective was to understand how COVID-19 influences preference for virtual orthopaedic rehabilitation consultations.

7.3 Methods

This research is a qualitative investigation to help us to further understand the results of Phase III of the CONNECT project.[100] The CONNECT project protocol has previously been published.[97]

7.3.1 Ethics

Ethical approval for DCE delivery was obtained for Phase III (approval received on 18 October 2019 from the London-Hampstead Research Ethics Committee - IRAS ID: 248064, REC Reference 19/LO/1586). A subsequent amendment for inclusion of qualitative interviews was granted on the 26th June 2020. All participants provided informed written consent via email prior to inclusion.

7.3.2 Setting

The research was conducted within a single specialist orthopaedic hospital in North London, UK. All participants were recruited from the Occupational Therapy and Physiotherapy Department.

7.3.3 Participants

A quota sample was recruited from participants who completed our Discrete Choice Experiment (DCE)[100]. The inclusion criteria are demonstrated in Table 18.

Table 18 Inclusion / Exclusion criteria for Phase 3b

Inclusion criteria	Exclusion criteria
• Patients, over the age of 18 years, attending the hospital for Physiotherapy or Occupational Therapy * • Patients who have experience of orthopaedic / musculoskeletal condition * • Patients who are able to provide informed written consent • Patients able to understand and speak English or a language covered by the RNOH Interpreter service * • Patients providing their contact details in Phase 3[100] of the CONNECT Project • Patients scoring 9/9 for F2F and at least 7/9 for VC	• Patients under the age of 18 years. • Patients without the capacity to consent * • Patients suffering from diagnosis other than orthopaedic as the primary cause (eg neurological or oncology disorders) * • Patients currently or previously treated by the lead investigator (AWG)*

* denotes criteria used for DCE[100]

7.3.4 Recruitment

Participants meeting the inclusion criteria were sent an email by the lead investigator (AWG) informing them of the research. Those who replied indicating they were interested in taking part were sent the participant information sheet. Written consent to participate in the research was gained via email. A mutually convenient time was then arranged for interview.

7.3.5 Data Collection

Interviews were conducted via Zoom software or telephone. A topic guide, focusing on the results of the DCE, was used to facilitate discussions (see Appendix M on page 379). Interviews were audio recorded and transcribed verbatim.

7.3.6 Data Analysis

Transcripts were uploaded into QSR NVIVO (version 12). A directed content analysis[174] was undertaken in accordance with the coding framework designed from the results of Phase III[100] of the CONNECT project. This took the following form:

i. Data identified within the transcripts and allocated to the most appropriate factor group from the coding framework (pathway factors, clinical factors, socioeconomic factors, equipment factors, objective factors, interaction factors, COVID-19 impact on preference).
ii. Data were characterised based on the question: *how does this factor influence preference for virtual consultations?*
iii. The characterisation from (ii) was saved as a node within NVIVO.

Initial coding was undertaken by one author (AWG) with support from CRM. Another author (HB) subsequently reviewed all nodes within the NVIVO file to check that:

a. Each node was an accurate representation of the interview transcript
b. Each node fit within the coding framework.

Data were then presented with excerpts from transcripts to illustrate salient features.

7.3.7 Coding Frame

The coding frame is shown in Table 19 on page 135. We were interested in data relating to:

How the context of the consultation (the circumstances of the consultation and the patient's symptoms and activity levels) influences preference.

i. How patient access to resources (based on their socioeconomic position and access to technological resources) influenced preference.
ii. How the requirements of the consultation (the objectives and whether the interactions required to fulfil the objectives) influence preference.
iii. The impact of COVID-19 on preference for F2F or VC.

Table 19 Coding Frame

	Context for consultation		**Patient's access to resources**		**Requirements of the consultation**		**How COVID-19 influences preference**
	Pathway Factors	**Clinical Factors**	**Socioeconomic Factors**	**Equipment Factors**	**Objective Factors**	**Interaction Factors**	**COVID-19 impact on preference**
Definition	The circumstances of the consultation	The clinical context, including patient symptoms and activity levels.	The socioeconomic position of the patient.	The patients access to, and willingness to engage with, technology for a consultation	The requirements of the consultation.	Whether the patient feels the interactions required to fulfill the objectives can be achieved with their clinician.	Whether COVID-19 changes the way patients feel about / prefer VC consultations
Research Question	How do pathway factors influence preferences for VC?	How do clinical factors influence preferences for VC?	How do socioeconomic factors influence preferences for VC?	How do equipment factors influence preferences for VC?	How do the requirements of the consultation influence preferences for VC?	How does the required clinical interaction influence preferences for VC?	How does the presence of COVID-19 influence preferences for VC?

7.4 Results

7.4.1 Respondents

Thirty-eight participants met the inclusion criteria from the F2F group. Of these, 26 did not respond, 4 declined interview and 8 were interviewed. Seventeen participants met the inclusion from the VC group. Of these 11 did not respond, 6 consented to interview with one participant subsequently unavailable for interview. Five were subsequently interviewed. Participant characteristics are demonstrated in Table 20 on page 138. Interviews lasted for an average of 50 minutes (range 34 to 79 minutes). Empirical data are demonstrated in Table 21 (Context for the consultation) on page 140, Table 22 (patient's access to resources) on page 144, Table 23 (what's required from the consultation) on page 148 and Table 24 (how COVID-19 influences preference) on page 152.

7.4.2 Context for the consultation

7.4.2.1 Pathway factors

Patients preferred virtual appointments early in the morning to avoid having to get up earlier and avoid rush hour traffic; public transport was busier during these times which was challenging for some patients and also led to patients preferring VC. Other patients however, preferred to get the appointment out of the way and were happy to travel. F2F appointments were easier later in the day as traffic volume would be reduced, there were fewer obstacles and there was a better chance of locating a parking space. Patients were less likely to prefer a F2F appointment for shorter durations, with some participants questioning whether it was 'worth' travelling in for only a 15-minute appointment; longer appointments made travelling in more worthwhile. Some patients felt that they would rather a F2F appointment with a longer wait between sessions as 'anything could happen' during that space of time.

7.4.2.2 Clinical factors

Particularly for patients suffering from pain, avoidance of pain was a driver to prefer a VC. Patients who struggled with daily activities, especially getting ready in the morning, found travelling to an earlier appointment problematic. Extended travel led to an increase in pain which could last for several days and this led to some preferring VC.

Patients preferred to see a specialist F2F, particularly when symptoms were bad so that someone could physically assess them. There was a sense that VC was not suitable to address complex problems. The fear of being isolated is a motivating factor to attend consultations F2F. One participant expressed a general desire for a VC; their dislike of seeing themselves on a screen would lead them to opt for a phone rather than a video call.

Table 20 Demographics of Participants

	Prefer F2F	Prefer VC
Number	8	5
Gender	F = 5 M = 3	F = 3 M = 2
Age	Average = 54 years; [range 38-79]	Average = 55 years; [range 20-75]
Ethnicity	White English = 5; Asian British = 1; Any other = 2; (Jewish =1, Mixed English = 1)	White English = 4; Asian British = 1
Highest Qualifications	School level qualifications = 4; Professional qualifications = 2; Apprenticeship = 1; Other = 1 (City & Guilds)	Degree (eg BSc, MSc) = 3; Professional qualifications = 2
Surgery for problem	No = 5; Yes = 3; (last month = 1; last three months = 1; last year = 1)	Yes = 5; (last month = 2; last year = 1; over a year ago = 2)
Condition restricting physical mobility	Yes = 5; No = 3	Yes = 5; No = 1

Symptoms	Upper limb = 2; Lower limb = 3; Spine / pelvis = 5	Upper limb = 3; Lower limb = 2; Spine / pelvis = 4
Access to VC equipment	Yes = 7 No = 1 Hardware: laptop = 4; desktop = 2; tablet = 3; mobile phone = 5 Software: FaceTime = 6, Zoom = 1; Facebook video = 1	Yes = 5 No = 0 Hardware: laptop = 3; desktop = 2; tablet = 3; mobile phone = 4 Software: FaceTime = 3; Zoom = 1; WhatsApp Video = 1
Cost of travel	£0.01-£10 = 6; £10.01-£20 = 1; £20.01-£40 = 1	£0 (free) = 2; £0.01-£10 = 2; More than £100.01 = 1
Preference score	9/9 F2F = 8	9/9 VC = 1; 8/9 VC = 1; 7/9 VC = 3

F2F = face-to-face consultation; VC = virtual consultation; F = Female; M = Male.

Table 21 Context for the consultation

Factor	*Participants accounts: Prefer F2F*	*Participants accounts: Prefer VC*
Pathway	*I'm not a particularly confident driver so I always go if I can avoid motorways and busy roads I do. Early in the morning that's quite difficult because you've got all the people, well, you used to have all the people going to work and going to school. It would be the driving that would put me off an early morning one. I would rather leave home about nine when the traffic's died down a bit [3BV03]* *But midday, physically it's just because they have to keep in mind travelling and everything, that's the only reason they want to have it midday, like one, two o'clock. Like I always wanted to have my appointment after two o'clock just because of the travelling. [3BV04]* *it (longer appointments) makes it more worthwhile. If you're just perhaps going to be just checked up on what exercises you're doing and then going, you've got to get there, park, get up the hill, which is a job in itself, and then wait around and then you're only going to be five or 10 minutes and then you're out again' [3BF02]* *Definitely I've had appointments where I felt that the clinician has been so thorough and made sure that they have done a thorough*	*If I get the organised transport, the hospital transport, they require turning up four hours prior to that appointment even though it takes two hours. So sometimes I have been up at two/three in the morning ready for an early appointment, and then by the time I get there, having taken my morning medication, I am in a mess because it's either not taken at the right time or…So yeah, that's very difficult for me, and yes we have tried to change appointments to the middle of the day, sort of early afternoon if possible, and sometimes we've managed it. [3BV06]* *If I have appointment at 8:30 in the morning I have to leave my house at five o'clock or six o'clock in the morning and it's a long journey for me. Because of the pain it would be really good if the physiotherapy team can call me and just carry on from that. [3BV04]* *Is it really worth it? Is it worth me going all that way to go for 15 minutes? I'm going to be seen for 15 minutes… it's not going to be a thorough appointment. I won't be seen. I won't be checked*

	check and gone down every avenue to rule out things. You just feel that. You feel a bit better in yourself, because you feel that they've really been thorough… they give you time to ask questions or answer questions. It's not rushed. [3BF05] *You haven't got quite so many obstacles with travelling if it's in the middle of the day, it's not so bad. But if you're in the rush hour or you have a day at work you're tired and just want to get home and so on. [3BF02]* *I would prefer when it's physical, yeah, face-to-face because anything can happen within six months. [3BF04]* *I don't know what the number is but there's definitely a number around six or eight you don't get more than. Dare I say if you're using them up on phone appointments and then you end up with say four phone appointments and two physical appointments, that would just be silly and a waste of time [3BF07]*	*properly. How is that possible for me to have 15-minute appointment and then just go? You feel cheated, I think. [3BF05]* *It's easy for me to get to and yes, it wouldn't cost me that much by public transport. I can see why, if distance and cost was a major impact for a 15 minute or half an hour appointment, then maybe you would prefer to have a virtual. [3BF03]* *People prefer to have first thing in the morning at home because then they have the whole day, or later in the evening when they can actually fit and have it either at the start of the day or the end of the evening, that's why. [3BV04]*
Clinical	*So I think it's worth having a face-to-face, but it's also worth seeing someone who has the expertise, do you know what I mean? [3BF07]* *I'm in no pain. It isn't like when I saw you that day. I was in bloody agony. So I needed a human being to physically see it and make it better. That's what I think [unclear]. Do you know human beings*	*Even if I'm in a car and I decide to drive, one day I got caught on the XX [motorway] coming to XX [hospital] and was stuck there for nearly two hours. Again, my pain levels were ridiculous for the rest of the week because it's got a knock-on effect. It's tough. That's generally the thing that causes the problems. [3BV01]*

	rely on human beings as well? Unfortunately Zoom and COVID and everything will make us less human I'm afraid, potentially. [3BF01] *Honestly, I've had my dodgy back since I was 15 and I've seen a lot of people. Honestly, I think for me, it's too complicated to do over the phone, over the video. That just might be me, but I can also see other people with other problems where I'm actually thinking well, we probably could get away with that more so. [3BF07]* *But when I could barely walk the other week, it was never - I could never have done that - I would have felt that I was getting - I wouldn't - it wouldn't have felt right for me because he couldn't have made me better virtually. [3BF01]* *I would just feel isolated. I would begin to feel isolated, and you become cut off from the outside world. You could just sit at home and have everything done at home and all your phone calls virtual, not face-to-face and everything. But where does that leave you with human interaction, social interaction? You're just isolated. [3BF05]*	*We’ve hit traffic accidents; we’ve hit loads of stuff on the way. So it is really difficult. Then really, i need a good hour of recovery before I see anyone when I gets* [sic] *there [laughs], to even being able to speak more coherently, if you know what I mean. Because pain takes over my speech and thinking process. So that’s really quite significant when you’re having a face-to-face; how much pain you are in to be able to communicate properly, if that makes sense [3BV06]* *Day-to-day activities is one of the areas that I do struggle with, but I've managed to find things to overcome it, and virtual is one of those things that help me to overcome the difficulties that I have with day-to-day living. [3BV01]* *I think I'd be more comfortable that way (having the camera off). I don't like being viewed; I think… Yes, I don't logically think I mustn't look in a mirror. There's always obviously a mirror in the bathroom but I'd never go and look at myself in a mirror, only when I'm washing my hands or whatever and the mirror's there… Yes. When I was a bit younger I never ever wanted my photo taken. [3BV02]*

7.4.3 Patient's access to resources

7.4.3.1 Socioeconomic factors

The cost of travelling to the hospital is one reason for patients wanting to have a virtual consultation, particularly if repeated appointments are required. Travelling to an appointment was more costly for patients who did not have access to a car, particularly if they needed to travel on public transport during peak travel times, which tends to have a higher cost. Taxis were particularly costly for some patients and the requirement for overnight accommodation for a F2F appointment further influenced preferences in favour of a VC. A patient's employment was a significant factor: some could afford to take time off work to attend appointments, while others would have to take unpaid leave. These financial factors influence preferences. Patients who had a degree were assumed to be paid higher than those who did not have a degree. Participants commented on how graduate jobs may have more chance of paid leave to attend appointments. More affluent patients were able to afford to take time out of work and attend a F2F consultation.

7.4.3.2 Equipment factors

Patients who lived with or near people who could support them with accessing or using equipment were in a stronger position to be able to use VC. Those patients who have been using technology for other areas of life and were familiar with it were more likely to choose VC than those who were not. Several patients reported an increased use of technology to communicate with work or family since the onset of the COVID-19 pandemic and would now consider using VC for their rehabilitation; particularly during the pandemic. Patients who did not have access to the equipment to conduct a VC were more likely to prefer a F2F consultation. In addition, poor internet connectivity was off-putting to patients.

Table 22 Patient access to resources

Factor	Participants accounts: in favour of F2F	Participants accounts: in favour of VC
Socioeconomic factors	*No, I mean thanks to God I'm from a good family background so financially - yes, personally I mean obviously through the injury myself I'm [broke] down completely because I'm not working for three years but when it comes to travelling I think my family members they've been very supportive. [3BV04]* *I do think it links to their role at work. A lot of people with degrees are in occupations where it might be quite nice to have a paid morning off.. Also, we get paid. People who have got degrees tend to be in jobs where if you have half a day off or a day off for an appointment, (a) you're covered by the Disability Act, the Equalities Act and (2) you get paid. [3BV01]* *For me, if I took the day off I will get paid. Where I work it would go down as a sick day and I would get paid. I'd be behind on my work,*	*Well, that would obviously be beneficial for them to have virtual, because they don't know how many appointments they're going to have. So if they're having to go on a two-weekly basis for physio, they're going to - I have to think twice before I go to an appointment. Before I got my disability badge, I had to think twice before I went to an appointment to XX Hospital, because the charges were so high for the car park. [3BF05]* *I've booked a cab four times - it cost me £200. One way is £125… I would be like, oh no I can't come because even dreams are impossible when you are injured, so the journey would be impossible for me because I wouldn't be able to afford £100/£200 every week or every two weeks. [3BF04]* *I mean, if I'm coming from XX then obviously it's quite far and it's like more than 100 miles, I think, around 100 miles. Imagine if I were living further away, I would have to look for accommodation first. [3BV04]*

	but I still would get my daily money for that, it wouldn't cause me any hardship. [3BF07] *So if I come in and see you at eight o'clock in the morning, I can come and see you, by nine o'clock I've left, by 10 o'clock I'm at work and my boss is quite happy. [3BF07]*	*Whereas, if you're in work like construction, for example, you don't get paid if you're self-employed, for having a day off. So, I think they're the kinds of jobs that if you don't get paid when you're having a consultancy because you're self-employed, you're going to prefer a virtual. I think it links very much directly to employment roles, workload, and whether you get paid when you have the time off work for consultations. [3BV01]* *If I couldn't get in my car and drive round the [x motorway], I can understand why it would be beneficial to be able to do it virtually. [3BF07]*
Equipment factors	*I've got my iPad set up and I don't have a big room to set it up and a tripod and all that sort of stuff. So the video is always pointing slightly the wrong way and stuff like that, it's not ideal. I think if we all did it more we'd be better kitted up for it. [3BF07]* *When you're doing exercises and it's running at about 10 frames a second or 20 frames a second, it's just not very good… I don't know whether it's just because XX got a lot on the internet, because I've*	*But they've [older people] normally got a big and young family who teach them how to do it. [3BV01]* *They (older people) use it more than us at the moment [laughs]. If you look into it, like my dad, my mum, everybody, they are using Twitter, social media, Facebook and all that. I'm like, "oh my God they're using it more than us". [3BV04]*

	only used it once, but the frame rate and stuff is just shocking. [3BF07] *Yes. I fall into that category, actually, because I'm not techy and whatever I seem to do with the phone goes wrong. Or the computer. Or the lighting system. I do have this strange effect on equipment [3BF04]* *I suppose if you take away the option of virtual, there's only one option left for them. They just have one option. They haven't got any other options. If they haven't got the technology or haven't got the equipment or don't know how to work the technology, virtual is not going to work for them, is it? [3BF01]*	*Yeah, WhatsApp and all of those sorts of things. I do quite a lot of craft work and so we've been doing Zoom for that. I don't think much work gets done, I think we just sit and yack [3BF02]* *I've been able to continue to work because I've been using the virtual meetings, which means that I can stay at home. So maybe that's just already in my mindset, compared to other people who only have only known one thing and feel that if it's - if they change that it might not be as good. [3BV03]* *I took the Zoom invite from my phone and then I just put the details on my work laptop. So I actually just typed in the meeting invite and the password and did it that way. That's no problem, but I could have done it, I guess, from my phone. Just pressed - tapped on the link and then just gone straight through to that waiting room. [3BV03]*

7.4.4 What's required from the consultation

7.4.4.1 Objective factors

Respondents expressed they were happy to have a virtual consultation if a physical examination was not required. Participants were happy, in general, to have a VC for a discussion. It was recognised that a fluctuating condition might require different input at different times. Basic rehabilitation was acceptable to some, others preferred any form of rehabilitation to be carried out in person. First appointments were generally seen as better if they were conducted F2F, particularly if physical rehabilitation was required to ensure exercises were being completed correctly. Follow up appointments were deemed to be more acceptable via VC, particularly if the clinician was known to the patient. If an issue required a thorough assessment F2F was identified as the best option.

7.4.4.2 Interaction factors

One participant in the F2F group argued for first appointments to be conducted virtually to allow for a (subjective) assessment to be conducted to plan care. This was at odds with most of our DCE respondents who preferred F2F for their first appointment; this demonstrates the individual nature of preferences. Virtual care was best with a therapist who was known and trusted by the patient, with a good rapport facilitating preferences in favour of VC. Participants who reported travel to be a challenge described previous experiences where their interactions with healthcare professionals were inhibited by symptoms, such as the inability to focus on the content due to pain. It was thought that, for those patients who do not speak English, accessing a family member to support translation would be easier from home. Participants who had established relationships with their clinicians had confidence in VC. Interactions were better F2F rather than VC as it was easier to see body language. One participant referred to interactions as 'cold' virtually [3BF05] and several commented on how VC created the illusion of clinicians not listening as intently and potentially becoming distracted. Physically attending gave the potential for more empathy which was important. Intimate examinations over VC might make patients feel uncomfortable which may influence interactions.

Table 23 What is required from the consultation

Factor	Participants accounts: in favour of F2F	Participants accounts: in favour of VC
Objective factors	*I still very much 100 per cent think your first appointment should be a face-to-face. I would want the first one definitely so I would know what the exercises were (a) that you showed me what to do, but also that I was doing them correctly. [3BF03]* *I just don't see how you can do it over the phone. Like I said, I think for follow-ups it's not too bad, I don't see how you could possibly do it only that, because I don't see how you could ever assess someone for the first time without having a prod. But I'm not a physio, so I don't know. [3BF07]* *But if it involves physical aspects where you're having problems, has it changed, how is your knee looking or feeling now, can we see it move, then no, you have to go in for a check. [3BF04]*	*In fact XX, a couple of weeks ago or last week, did actually phone out of the blue for an update. Everything that has been said previously they've sort of said again and it worked very well over the telephone [3BV06]* *It seems like I can do that over the internet much easier than I can in person. It feels like a waste of time, where this is quick. I can say what I need to, they can ask the questions, I can answer them, it takes 10/15 minutes out of my time, consultation over. [3BV01]* *But if I'm just coming up to be told a couple of things by someone looking on a screen and then saying this and that and then that's it – then it is really pointless. [3BV06]* *At the moment the way my leg is I would be quite happy - if you were my physio today I would sit here and I would show you how far I can bend my knee backwards and what I can do with it. It's not as swollen as it was et cetera, et cetera. I think that's perfect [3BF01]*

	Certainly, in a physio setting, somebody demonstrating how to do exercises or specific movements, I don't know how the physio knows by virtual whether you're actually doing them right or not. [3BF03] *I would want a physical face-to-face appointment if I'm having a specific problem or a new issue. I mean, I've been there long enough that they know my condition and that's fine. [3BV03]*	*I could teach anyone how to stretch their calves or their hamstrings, because I have to because I've got a dodgy back. That is less specialist and that is just the standard exercises out of the book, I'd call them. [3BF04]*
Interaction factors	*I still think it's an age thing because I think it's a security blanket going to see XX. You've built up that trust and that rapport over the last 20-odd years and you know they are doing their best for you. [3BF01]* *When you're face-to-face, personally, I think you can engage better. You can see by people's expressions, their movements, or their body language, which I don't think you can always do when you're on a virtual. [3BF03]* *Whether you're gaining the therapist's attention, full attention, as in - compared to a face-to-face. You can see what they're doing. I do worry that there was other things going on. They were using the*	*I think the first appointment it's always good to have virtually. The reason is that you can actually speak to your physio team and you can explain to them and they will be prepared, they will know that exactly. This patient, it's their first appointment, you can speak to them virtually, they know exactly what the issues, what the problems are. They can have their own plan and let's say the second appointment is face-to-face, so they know about you, they have a knowledge. Reading about you is one thing but speaking to you is another thing [3BV04]* *XX would know my knee was fine. There's that trust, isn't there. XX - [he'll go, it's alright XX] your knee is not bad at the moment. Next time we'll just do it - over the iPhones or whatever. I'll go yeah, yeah cool. [3BF01]*

	phone, answering other calls, or writing other texts, because you only see a head above. [3BF03] *If I've had a telephone conversation, people can - it's much easier to switch off what you're saying or not hear clearly or misunderstand thing when you have a virtual one. [3BF04]* *I think that in itself is a kind of therapy, really, because when you - no matter what you're going through, if someone else can see and are empathising with you, you start to feel a little bit better. You start to feel, well, someone here is concerned about me. They're going to try their best to help me. I find the - I just find video calling a bit cold. [3BF05]* *I know things like Zoom has tightened up on their security. So maybe if they're having more intimate type of examinations or having to remove clothing and all the rest of it, they might feel a bit uncomfortable doing that on a screen [3BV03]*	*If you've got a good rapport with them, and the patient gets confident that what they're saying is true, then yeah, I think that [vc]'s a good option. [3BF03]* *Plus it can sort of read wrong results into it, where if you've travelled for a long time and you're really hurting when you get there, then you're not really showing the true average day as well, so I don't know. [3BV02]* *They may have more success to have an interpreter within their own home and then they wouldn't have to impinge on that person's time, as well, to take them to the hospital with them [3BF09]*

7.4.5 How COVID-19 influences preferences

VC during COVID-19 has provided patients with the opportunity to access their care virtually without the need for travel. For some, this was extremely positive. The pandemic highlighted the potential use of VC technologies and participants in this study thought that their use has increased across society. The potential benefits of VC in healthcare have become apparent to participants whereas these benefits were not previously visible. The healthcare and pandemic situation is different for the participants in this present study compared to when they completed the DCE (pre-pandemic). Due to this, participants stated they would answer the DCE differently if it were to be undertaken during the pandemic.

Participants were fearful of catching COVID-19 and could see that VC offers an opportunity to access care without being put under any undue risk of transmission. Travel, particularly on public transport, was seen as a high-risk activity for patients and some participants stated they would avoid this wherever they could. COVID-19 influenced patients' preferences; many rationalised the trade-offs between travel and virtual care and although they would normally prefer F2F they would, under the current circumstances, opt for a VC. Despite this, a small number of participants expressed they would still travel in for their rehabilitation if this were available.

A hospital environment was viewed as a sterile, clean, place where there would be low risk of COVID-19 transmission. Participants cited infection control policies and procedures and would be happy to travel if they had access to their own transport. One participant suggested waiting in the car park until the clinician was ready to avoid spending unnecessary time within the hospital. Clinicians wearing Personal Protective Equipment inspired trust and one participant commented how they felt they were more likely to contract COVID-19 in a supermarket.

Although participants who were strongly in favour of F2F prior to the pandemic would consider undertaking a VC during COVID-19, they expressed a continued desire to have F2F consultations after the pandemic. Despite this, a greater appreciation of the potential benefits of VC was felt by all participants. It was felt by some participants that once the pandemic was over F2F care will become the norm once again.

Table 24 How COVID-19 influences preference

Factor	Participants accounts: in favour of F2F	Participants accounts: in favour of VC
Impact of COVID-19 on preference	*I’ve been into many hospitals, I’d never been to a hospital where it was so clean. I mean, the operation theatres, the wards - it was absolutely fantastic up there. You had complete confidence that you’re not going to get an infection, or you’re not going to come out with a problem. The nursing up there was fantastic [3BF08]* *Ninety per cent of the hospitals have got automatic doors, so you don’t have to touch anything. You go in, there’s somebody waiting for you in the reception area, they take you to see the person you want, and when that person’s finished with you, that person takes you back and lets you out through the front door [3BF08]* *If you said to me, can you come in? And I sit in the car, and you phone me and say, right, come in now, the door’s open, [unclear]*	*Before COVID I was discussing with my physiotherapy and occupational therapist that if she could provide any phone assistance or just, I mean video calls, because that would be easier for me because I was in a lot of pain throughout - it's been three years since my injury. So, going there, coming back here it's a long journey and so that's why I was - when you guys approached me, I said, this is a really good thing to have. If it happens, really good. [3BV04]* *Everyone felt comfortable with it. But yeah Zoom is good. I know my wife has used it before - a long, long time before COVID. She was looking after some foreign buildings for a large corporate. There was obviously a lot of cost saving on jumping on airplanes backwards and forwards to different countries. Zoom costs £12 month. Flights.com cost a lot more. So yeah [3BF01]* *But because of COVID we are trying that now. That whole technology was sitting there but nobody was using it so because of COVID now everything has changed,*

	walk straight into an office or wherever it is with you - I'm completely happy to do that. [3BF08] *You just go in the safest environment you can get there in, whether it means that you go and, obviously, you wear a mask and you – I mean, the hospitals, themselves, I don't think are any more riskier than going into Sainsbury's or Tesco, so I can't see, you know, they've got as much PPE as they've – obviously your – the people dealing with you are protected, and the environment themselves are cleaned as much as, and you've just got to be aware of what your surroundings are, haven't you, really [3BF09]* *Once we have access to vaccinations, that's it, back to normal. Everything. You'll see the shopping centre, the hospitals packed, and people will forget about all these virtual appointments, I think. [3BV04]* *I think the NHS has always been about caring for the population and for people and everything, and when you don't have - when you're not going there physically and you're not having that*	*like shopping, everything. Not only that, I mean if you look into it the technology is coming into like more than ever. Everyone is trying to get their - people who didn't have smart phones, they're getting smart phones, people who didn't have laptops are getting laptops. [3BV04]* *Yeah. COVID has made us learn all new sorts of skills as well. We do a lot of client meetings through Zoom. [3BF01]* *I think because of the situation now with COVID it's a completely different scenario from how it was before. So I suppose what my views were then and what my views are now are a bit different because obviously we don't have that facility now that we did have [3BF02]* *In normal circumstances I would have driven in and I would have preferred to have driven in but because I haven't been going out and feeling a bit nervous about going out, when you asked me, I thought no, I think I'd rather stay put. In another couple of weeks I'm sure I'll be a lot more confident because I'm going to start going out a bit more [3BV02]* *From where I live which is, I don't suppose you know XX, but well, this part of XX which is XX, to get up to London I have to go on a train and at least one tube, if*

	physically, it feels a bit cold. It feels a bit cold and just routine and not - I just feel that's being lost from the country. I think that aspect of it is being lost. Everyone's relying too much on technology, and we're losing that whole human interaction [3BF5]	*not two tubes depending on where I'm going. No, I'm not prepared to do that... I'm not going on tubes. [3BV02]* *Look, unfortunately, we're under very different circumstances at the moment. Yeah, it's great to sit down with somebody across a table....o this, this, and this, but on the phone what we've been doing is Zoom, sometimes your mind - you're concentrating on something else, but it's fine. I mean, I would like to sort of come up to XX, sit down with you for the half an hour and run through everything, because you'll have a [peg board] with you, but it's not viable at the moment. [3BF08]* *At the moment I wouldn't go to a hospital unless it was absolutely dire [3BF02]* *I would wait for COVID to finish because I'm not going to put myself in that position, or anybody else. Because you don't know, it might not be you that becomes ill, but it might be someone else that you've effectively infected to make them very poorly [3BF02]* *Well I have said my reasons for wanting to visit a hospital. With this issue it's completely new to us and I think you've just got to move with how it is to be sensible, to protect the hospital and its staff and its patients [3BF02]*

		Yeah, and I think, as well, with the Coronavirus, I think a lot of things that people have had to go on to do virtually they would never have may be chosen to but have had no choice. They've done it and thought, well, you know [3BF09]

7.5 Discussion

Despite the DCE being terminated prematurely due to the COVID-19 pandemic, the results from the DCE suggested a tendency for certain patient groups to have preferences for VC.[100] A sub-sample group of participants with strong preferences for and against VC were identified from the DCE to participate in this present study. This study investigated the results of our previous DCE and provides additional useful insights. Thirteen participants (8 strongly in favour of F2F, 5 strongly in favour of VC) were interviewed to investigate the results of our DCE. In addition, several reasons why COVID-19 may have changed patients' preferences towards VC during the pandemic were identified.

Our DCE[100] indicated that patients preferred VC when the therapist was known to the patient, there was a longer time until the next appointment, a shorter appointment early or late in the day; for patients without a degree, who had access to the equipment they need, had difficulty with day to day activities, were undergoing rehabilitation for multiple problem areas and hade to pay more than £5 for their return journey. Conversely, the opposite pre-conditions (when the therapist was not known to the patient, a shorter time until the next appointment, a longer appointment, in the middle of the day; for patients with a degree or above, did not have access to the equipment to undertake a virtual consultation, did not have difficulties with day-to-day activities, were undergoing rehabilitation for a single problem area and had less than £5 to pay for their return journey) led to patients preferring a F2F.

Patients preferred not to travel early in the morning for therapy if they had difficulty getting ready, had to wake up unacceptably early or did not like driving in rush hour. Ackerman and colleagues[175] identified that patients had preferences for certain times of day and this being a reason for not attending a self-management course. We have demonstrated how time of day can motivate preferences, with appointments in the middle of the day being easier for some due to reduced traffic and easier parking. Public transport can be more costly at peak times (i.e. early morning). Patients with musculoskeletal conditions may experience morning pain and stiffness[176]; these morning symptoms contributed towards patients preferring VC for an early appointment. Some patients may appreciate being able to spend time and energy gained from not travelling on other activities.[114] Elimination of transport time when using VC has been shown to be a significant benefit.[111] Our recent systematic review and qualitative synthesis[98] highlighted how changes in the work of being a patient influences preferences; if factors relating to travel and logistics make the work more burdensome for patients they are more likely to prefer an option that is less burdensome. PhysioDirect,[102] a randomised trial investigating telephone advice and assessment services for physiotherapy, was more successful when calls were made at a convenient time for patients.[20] Time of appointment may not be a *true* reflection of preference for VC, rather the option of VC at that time making an appointment more convenient for patients at that time. Some patients in this study, however, liked an earlier appointment so they could travel in and get to work or other commitments earlier in the day. Some patients have reported the benefits of undergoing a Skype consultation from work.[107] Trends identified by our DCE do not apply to all, preferences are clearly individualised.

Being able to take paid time off work was important to allow F2F attendance with reduced financial burden. People in education to school leaving age are over represented in 'zero hours' contracts[161] and therefore may be unable to take paid leave for medical appointments. This may be challenging for some who have undergone surgery before their rehabilitation and been forced to take time off work previously.[177] A participant in our previous research[99] described how appointments had become a full time job; repeated attendance can get in the way of employment and travel can be financially demanding.

Equipment can be costly; 'Attend Anywhere', the platform of choice across the NHS in England and Scotland, requires Windows 7+, MacOS 10.11+ (released 2009 and 2015 on Windows and Mac respectively) on a desktop and Android 5.1+, iOS 12.4+ (released 2015 and 2019 on Android and Apple phones or tablets respectively) with up to date Chrome or Safari software.[178] A patient's financial position may remove the opportunity for VC through the initial purchase and the ongoing costs of some software that drive up data usage costs. When outdated hardware was incompatible with the platform, this led to reduced patient satisfaction.[31]

Many of the patients in this study preferred to have a F2F prior to a VC, although one patient reported they would be happy for an initial assessment. Other studies[107,111] reveal how patients favoured initial F2F appointments prior to VC. For our patients, this was to conduct a thorough assessment and to learn the correct exercises. If a patient was experiencing a worsening of symptoms, they are more likely to want a F2F. VC offers flexibility[115] but patients might also want a F2F to identify the cause of a new problem should it arise.[107] Some patients felt that VC would not be accurate whereas Cottrell and colleagues[179] found high levels of agreement between in-person assessment of patients and telehealth appointments. Teleconference goniometry has been shown to be as accurate as in person goniometry of the elbow.[180]

Therapists are forced to rely on their talking and listening skills (as opposed to hands on) which may be problematic for patients with communication difficulties; ordinary conversation has been demonstrated to be a key factor of a therapeutic relationship.[181] One participant in this study reported not liking seeing themselves on a screen, participants with social anxiety disorder have been shown to have self-focused attention during conversations using Skype.[182] Patients have been shown to be skeptical about telephone appointments prior to use.[20,27] However, trying out a VC platform has been shown to increase positivity about ease of use and usefulness compared to those who did not use it[111] and may alter the perception of the patient-therapist relationship.[111]

Nationally in orthopaedics, routine care was abandoned due to COVID-19 to reduce patient 'flow' to prevent the NHS being overwhelmed.[183] The NHS now faces an estimation of 400,000 procedures not being performed every month.[184] Virtual orthopaedic consultations have subsequently been hastened and rapidly implemented,[31] with new guidance for virtual care being disseminated widely to support use in orthopaedics.[185] Patients in this study indicated that their stated preferences in our Discrete Choice Experiment (conducted between December 2019 and March 2020) would have been more favourable towards VC if they were able to foresee the impact of the pandemic. Patients did not feel F2F was viable during the height of the pandemic and were not happy to take public transport. Patients were using platforms like Zoom and WhatsApp to communicate with friends and family and reported they felt more confident with using VC to access care; prior to the pandemic some patients had not used these technologies. Using VC highlighted the benefits of not travelling and saving money. Some patients, however, would still be happy to travel for a F2F appointment as they believed the risks of transmission would be low with proper precautions. It was suggested by some that everything would return to normal after the pandemic subsided and F2F would resume once more. Interestingly, of those patients who were unable to have a F2F due to COVID-19, less than half of VC patients would prefer a VC next time.[31] The pandemic has affected preferences in the short term, what is not clear is how preferences will be affected in the long term.

7.6 Strengths and limitations of this study

Our previous DCE results indicated factors that influenced preference for VC or F2F. The interview schedule and coding frame from this present study reflected this, and it is possible that different or additional questions may have yielded different results. Of the participants eligible for inclusion, 68% did not respond to the initial or follow-up email; an increased number of participants may have changed our conclusions. The limited pool of participants who had strong preferences for VC reduced our potential sample and as a result the recruitment reflects a larger number of participants in favour of F2F from our DCE. An alternative sampling strategy may have led to a higher level of recruitment than was observed in this study. Higher recruitment numbers may have influenced our conclusions. Despite these limitations, we have been able to sample groups of patients who were able to offer a diverse range of perspectives. We have used theoretically informed qualitative methods to interpret a DCE through interviewing these participants to understand what they think these results mean. These results will be of particular interest to the physiotherapy and rehabilitation community who are using virtually supported consultations in their patient pathways.

7.7 Conclusion

This paper presents a study that investigated the results of a discrete choice experiment and has explored the impact of COVID-19 on patient preferences for VC. Patients suggested a range of potential reasons as to how the context of the consultation, patient's access to resources and the requirements of the consultation might impact their preference. In addition, patients shared experience and viewpoints on how the COVID-19 pandemic has influenced preferences for VC. VC during COVID-19 has provided patients with the opportunity to access their care virtually without the need for travel. For some, this was extremely positive as it provided opportunities to access care without the need for F2F social interactions and potentially risk contracting the virus. Many felt that VC would become more commonplace after the pandemic whereas others were keen to return to F2F consultations as much as possible. This research sheds light on some of the underlying rationale behind patient preferences for VC in certain situations.

7.7.1 Ethics approval and consent to participate

Ethical approval for DCE delivery was obtained for Phase III (approval received on 18 October 2019 from the London-Hampstead Research Ethics Committee - IRAS ID: 248064, REC Reference 19/LO/1586). A subsequent amendment for inclusion of qualitative interviews was granted on the 26th June 2020. All participants provided informed written consent via email prior to inclusion.

7.7.2 Authors Contributions

AWG designed the study with CRM, MS and JJ. AWG completed data collection. AWG and HB conducted the first iteration of data analysis with the support of CRM. AWG drafted the manuscript with CRM and JJ. All authors edited the manuscript and approve the final version to be published.

7.7.3 Acknowledgements

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Research and Innovation Centre at the Royal National Orthopaedic Hospital for their ongoing support. The authors are grateful to the patients who participated in this study.

Chapter 8 Patient, clinician and manager experience of the accelerated implementation of virtual consultations following COVID-19: a qualitative study of preferences in a tertiary orthopaedic rehabilitation setting

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8.1 Abstract

Aim

To investigate the experiences of patients, clinicians, and managers during the accelerated implementation of virtual consultations (VC) due to COVID-19. To understand how patient preferences are constructed and organised.

Methods

Semi structured interviews with patients, clinicians and managerial staff at a single specialist orthopaedic centre in the UK. The interview schedule and coding frame were based on Normalisation Process Theory. Interviews were conducted over the telephone or by video call. Abductive analysis of interview transcripts extended knowledge from previous research to identify, characterise and explain how patient preferences for VC were formed and arranged.

Results

Fifty-five participants were included (20 patients, 20 clinicians, 15 managers). Key mechanisms that contribute to the formation of patient preferences were identified. These were: (a) context for the consultation (normative expectations, relational expectations, congruence and potential); (b) the available alternatives and the implementation process (coherence, cognitive participation, collective action, and reflexive monitoring). Patient preferences are mediated by the clinician and organisational preferences through the influence of the consultation context, available alternatives and the implementation process.

Conclusions

This study reports the cumulative analysis of five empirical studies investigating patient preferences for VC before and during the COVID-19 pandemic as VC transitioned from an experimental clinic to compulsory form of service delivery. This study has identified mechanisms that explain how preferences for VC come about and how these relate to organisational and clinician preferences. Since clinical pathways are shaped by interactions between patient, clinicians, and organisational preferences, future service design must strike a balance between patient preferences and the preferences of clinicians and organisations.

Patient and Public Contribution

The CONNECT Project Patient and Public Involvement (PPI) group provided guidance on the conduct and design of the research. This took place with remote meetings between the lead researcher and the chair of the PPI group during March and April 2020. Patient Information Documentation and the interview schedule were developed with the PPI group to ensure that these were accessible.

Keywords

Patient preferences, clinician preferences, organisation preferences, virtual consultations, normalisation process theory, covid19.

8.2 Introduction

Virtual Consultations (VC), a collective term for phone and video consultations, received significant interest during the COVID-19 pandemic. Their use allowed patients to access healthcare whilst avoiding close social contact. The COVID-19 pandemic accelerated the implementation of the NHS Long Term Plan[4], which called for digitally enabled outpatient care across the NHS. The NHS *What Good Looks Like* framework[186] provides guidance for health and care leaders to digitise services with a view to 'improve the outcomes, experience and safety of our citizens'.

In March 2020, the British government asked people to 'stay at home' and 'protect the NHS' as the COVID-19 pandemic took hold. Many hospitals within the UK rapidly turned to VC to continue delivering healthcare whilst also adhering to social distancing guidelines. In May 2020, 185 NHS organisations were set up with the platform 'Attend Anywhere', and thousands of video consultations were carried out each day.[187]

VC is now central to the ongoing functions of patient care within the NHS in the UK. VCs have been shown to result in high levels of satisfaction[38,188] and to be a feasible method to maintain care during the pandemic.[31,37] The UK's Department of Health established guidance for face-to-face (F2F) assessments during COVID-19[189] which included requirements for risk assessments, temperature checks, face coverings, hand sanitiser, social distancing, provision of Personal Protective Equipment, cleaning after appointments and ventilation. Use of remote consultations before any in-person contact was recommended during the pandemic.[190] During 'lockdown', the opportunity for patients to have F2F care was limited.

Prior to the COVID-19 pandemic there was an accumulating evidence base around small, pilot-stage projects of both telephone and video consultations across healthcare. A review of the literature, published in 2014, identified 27 published studies on the use of Skype (a software for video consultations) consultations with the majority of these being small pilot projects.[16] Our previously published qualitative systematic review identified nine studies reporting the use of VC (both phone and video) in an orthopaedic rehabilitation setting prior to the pandemic. The majority of these were small projects embedded within larger trials.[98] The VOCAL study[17] aimed to provide an in-depth study of the advantages and limitations of video consultations across two contrasting clinical settings. Greenhalgh et al provided a comprehensive overview of the complex challenges of embedding video consultations in practice.[108] Much of the research published since the COVID-19 pandemic investigates the acceptability of VC and the degree to which patients are satisfied with its use.[38,188]

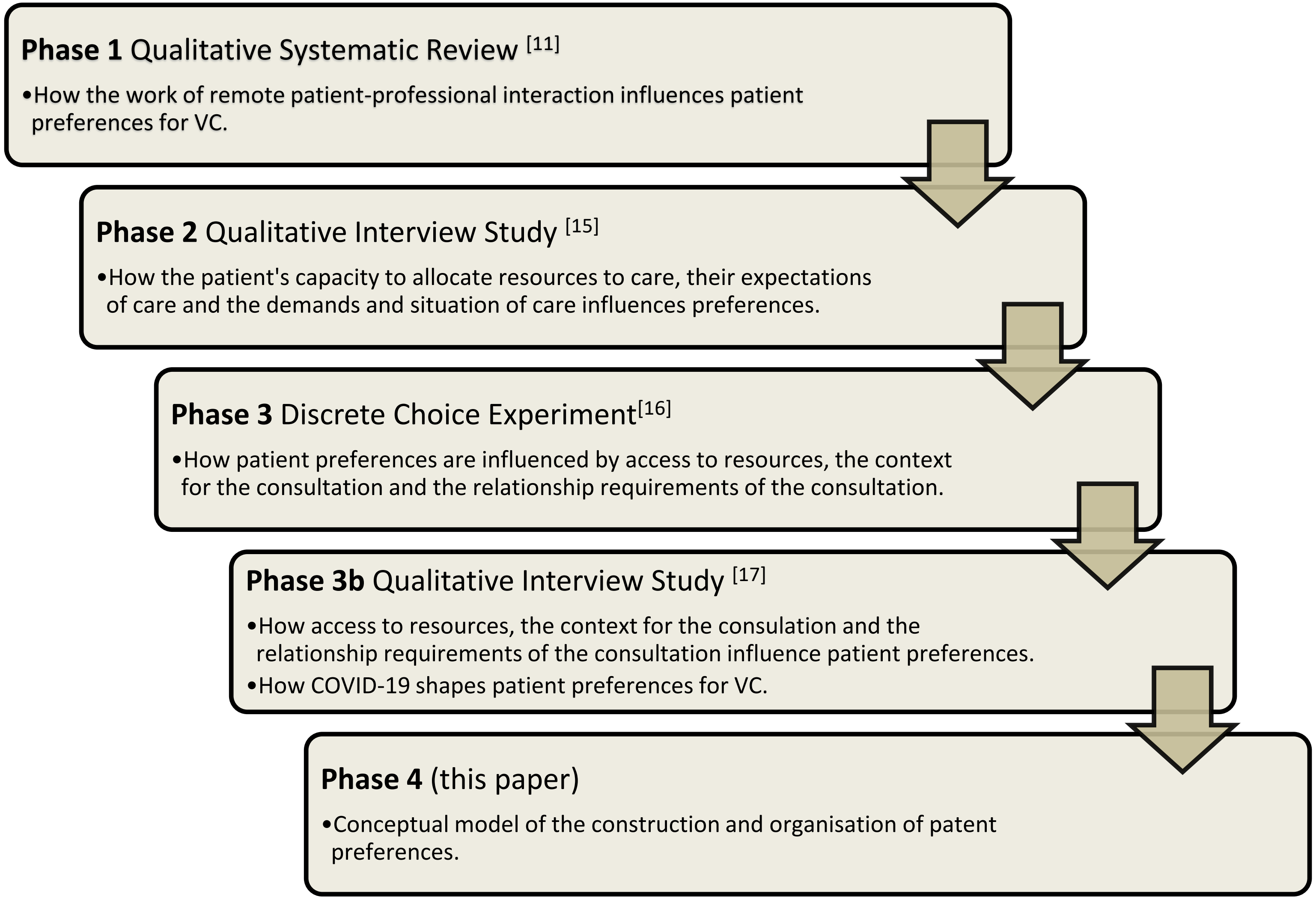
This paper is the final phase of the CONNECT Project;[97] a mixed methods study that investigates patient preferences for virtual consultations. The overall purpose of the project was to understand the potential interactions between patient preferences and use of VC in orthopaedic rehabilitation (a summary of the different components of the project is given in Figure 13 on page 166). Previous phases found that patient preferences for VC are influenced by the work patients themselves are required to do,[98] their own situation and how this shapes their expectations about the use of VC.[99] Patient preferences are influenced by whether they have access to the required resources to meet the requirements of the consultation.[100] COVID-19 appeared to influence preferences in favour of a VC but we cannot be sure whether this shift is permanent.[191] This paper brings together these previous studies to develop a model of preference formation through an empirical investigation into the experiences of VC implementation due to COVID-19.

To enable healthcare services to design pathways that enhance the uptake of appropriate use of VC in clinical practice, it is important to understand how patients form their preferences. The aims of the study reported in this paper were to investigate the experiences of patients, clinicians, and managers during the accelerated implementation of VC (both phone and video consultations) due to COVID-19. The study aims to identify, characterise and explain how patient preferences to implement VC are decided and how they are organised following on from the COVID-19 pandemic. The research question for this study was *'how are patient preferences for VC decided and organised following COVID-19?'* The protocol for the CONNECT Project was previously published[97].

The study is informed by two theoretical perspectives.

(i) Normalisation Process Theory[50] (NPT) provides an underpinning line of enquiry into the implementation process of VC.
(ii) Preference theory[5] provides understanding of how patient preferences are decided for VC.

Both Normalization Process Theory and Preference Theory rely on ideas about social and mental mechanisms to explain the outcomes of implementation processes and the production of preferences. Indeed, qualitative analysis of this problem must provide accounts of why phenomena occur[192] and how these are motivated or shaped by different mechanisms. A mechanism can be defined as a process that 'brings about or prevents change in a concrete system'[193], and that involve 'constellation of activities and entities that are linked to one another in such a way that they regularly bring about a type of outcome' (p11)[194]. These definitions underpin the work that follows.



Phase 1 Qualitative Systematic Review [11]

- How the work of remote patient-professional interaction influences patient preferences for VC.

Phase 2 Qualitative Interview Study [15]

- How the patient's capacity to allocate resources to care, their expectations of care and the demands and situation of care influences preferences.

Phase 3 Discrete Choice Experiment[16]

- How patient preferences are influenced by access to resources, the context for the consultation and the relationship requirements of the consultation.

Phase 3b Qualitative Interview Study [17]

- How access to resources, the context for the consulation and the relationship requirements of the consultation influence patient preferences.
- How COVID-19 shapes patient preferences for VC.

Phase 4 (this paper)

- Conceptual model of the construction and organisation of patent preferences.

Figure 13 Overview of prior phases of the CONNECT Project research

8.3 Methods

This paper is part of a larger body of work and forms Phase IV of the CONNECT Project. The protocol for the CONNECT Project has been published elsewhere.[97]

8.3.1.1 Setting

The research was conducted within a single specialist orthopaedic hospital in North London, UK. All participants were recruited from within the specialist hospital. The hospital had set a target of 80% virtual consultations[31] to reduce footfall and thus the risk of infection during the pandemic.

8.3.1.2 Participants

We aimed to recruit 20 patients, 20 clinicians and 15 managerial staff (including operational, improvement, administrative and clinical managers). We took a pragmatic approach to recruit an accessible sample of participants: for patients we aimed to recruit at least 10 male patients and 10 female patients; for healthcare professionals we aimed to recruit a range of occupational therapists and physiotherapists with experience of delivering VC; for managerial staff, we aimed to recruit a range of professionals with experience of being involved with the planning, set up and delivery of VC since the start of the pandemic. Participant inclusion and exclusion criteria are detailed in Table 25 overleaf.

Table 25 Inclusion / Exclusion criteria for Phase 4

Inclusion criteria	Exclusion criteria
• Patients, over age 18 years, attending the research site for Physiotherapy or Occupational Therapy. • Patients with experience of orthopaedic / musculoskeletal condition. • Patients able to provide informed written consent to enter the study • Patients able to understand and speak English or a language covered by the RNOH Interpreter service. • Physiotherapists or Occupational Therapists (or assistants) who have delivered VC to treat patients with orthopaedic / musculoskeletal disorders. • Managerial staff (including clinical managers) with experience of VC.	• Patients without the capacity to consent. • Patients suffering from disorders other than orthopaedic as the primary cause (e.g., neurological or oncology disorders). • Patients currently or previously treated by AWG. • Staff members with no experience of VC.

8.3.1.3 Recruitment

An emailed invitation to participate in the study was sent to all occupational therapists and physiotherapists with experience of using VC. *The pool of clinicians and therapy managers was taken from the 'Physiotherapy' and 'Occupational Therapy' departmental e-mail lists.* Clinical managers within the organisation who had a role in the deployment of VC were *also* invited to participate. *The pool of managers was sampled from the 'COVID-19 response group' mailing list that supported the roll out of VC during COVID-19. The pool of patients was taken from the clinician treatment lists; clinicians directly approached patients and informed them about the study. At this stage, patients had the opportunity to 'opt in' to be contacted by the researcher by emailing him directly or asking their therapist to facilitate contact via email or telephone.* Once a patient had indicated they were happy to be approached, an email letter of invitation was sent to them, and they were asked to formally agree to be sent information about the study. Eligible and interested potential participants were provided with a participant information sheet and given at least 24 hours to discuss the study with the researcher. They were enrolled in the study upon informed consent, received by email, using a specifically designed email consent form.

8.3.1.4 Data Collection

The interview schedule was developed based on Normalisation Process Theory.[50,67-70] Definitions of the constructs of NPT can be seen in Table 29 on page 182 and Table 30 on page 190. The full interview schedule can be seen in Appendix N on page 380. Interviews were conducted using phone or video call. Interviews lasted around 60 minutes with the option to extend or shorten as required. All interviews were conducted by the same investigator (AWG, a male clinical research physiotherapist who is employed at the research site), and were audio recorded and transcribed verbatim.

8.3.1.5 Data Management and Analysis

Following transcription, the audio recordings were reviewed with the completed transcripts by AWG to enhance the familiarity with the content. The process was undertaken to review the content of the transcripts and to ensure all identifiable data were removed.

Interview transcripts were reviewed and uploaded into NVIVO (version 12). Data analysis followed the principles of abduction as set out by Tavory and Timmermans,[95] described below:

1(a): Coding initially undertaken in NVIVO by AWG.

The approach to open coding was taken whereby the concept of each line of the transcripts was identified and attributed a description of the content. Attributions of content took the form of an NVIVO ‘node’. Once completed, the NVIVO nodes were reviewed by CRM to ensure the node was an accurate representation of the content. A worked example is demonstrated below:

Table 26 Illustration of Open Coding in Phase 4

Raw Data	***Assigned Node (description of content)***
[C4-2] There are things that you might pick up through tactile feelings. So I would have slight concerns about doing it all virtually from a clinician point of view.	*Concerned will not be able to pick everything up without hands on Ax*

1(b): **Nodes were then arranged in relation to the *NPT* coding manual, shown in Appendix O on page 383.**

All the nodes were then exported into Microsoft Excel. The decision to do this was for two reasons: (1) NVIVO crashed with more than 10 transcripts worth of nodes and it was not possible to combine all the nodes in one NVIVO file (2) to allow for sharing between the research team. The list of nodes were all within one column and the NPT code was typed into the adjacent column. The final organisation of codes was reviewed by CRM.

Table 27 Illustration of NPT Coding in Phase 4

Assigned Node (description of content)	***NPT Code***
Concerned will not be able to pick everything up without hands on Ax	*Differentiation (Coherence)*

1(c): Codes were characterised in light of the previously gained knowledge arising from the CONNECT Project in Phase I[98], Phase II[99] and Phase III[100,191].

The purpose of the characterisation was to abductively extend insights from the previous research to develop new insights into the development and organisation of patient preferences. The purpose of this process was to define the factors that are important in the formation of preferences. The final set of constructs can be seen in Table 29 on page 182.

Table 28 Characterisation of codes in light of previously gained knowledge from the CONNECT Project

Previous Constructs from CONNECT Project models in Phase 1 – Phase 3b	***Questions to consider from Phase 4 data***
Expectations[99]	*What does the phase 4 data tell us about Expectations?*
Interactions[98]	*What does the phase 4 data tell us about Interactions?*
Situation[99]	*What does the phase 4 data tell us about the Situation?*
Demands[99]	*What does the phase 4 data tell us about Demands?*
Context for the consultation[100,191]	*What does the phase 4 data tell us about Context for the Consultation?*
Requirements of the consultation[100,191]	*What does the phase 4 data tell us about Requirements of the Consultation?*
Requirements[98]	*What does the phase 4 data tell us about Requirements?*
COVID-19[191]	*What does the phase 4 data tell us about COVID-19?*
Capacity[99]	*What does the phase 4 data tell us about Capacity?*
Patients access to resources[100,191]	*What does the phase 4 data tell us about Patients access to resources?*
Resources[98]	*What does the phase 4 data tell us about Resources?*
Environment[98]	*What does the phase 4 data tell us about Environment?*
Work[98]	*What does the phase 4 data tell us about Work?*

2: Codes were then characterised in relation to the research question '*how are patient preferences for VC decided'*

Codes were mapped across several iterations to develop a model that explained how preferences are decided. The steps taken were to:

a) *Map the relationships between constructs identified from these data*
b) *Characterise the relationships between constructs*
c) *Characterise the mechanisms that contribute towards the formation of patient preferences.*

The iterations of the model can be seen in Figure 37-32 within Appendix P on page 389.

3: Codes were subsequently characterised in relation to the research question '*how are patient preferences for VC organised*'

Specific data relating from patients, clinians and managers were characterised in relation to how patient preferences are organised in relation to clinician and manager preferences. A description to accompany the final model can be seen in Figure 33 within Appendix P on page 396.

Reporting was conducted using the Standards for Reporting Qualitative Research[141] (the report can be seen in Appendix Q on page 397).

8.3.1.6 Patient and Public Contribution

The CONNECT Project Patient and Public Involvement (PPI) group provided guidance on the conduct and design of the research. This took place with remote meetings between the lead researcher and the chair of the PPI group in March and April 2020, where it was decided an amendment should be submitted to NHS ethics to change the focus of the study to understand patients, clinicians and managers experiences of VC during COVID-19. Patient Information Documentation and the interview schedule were developed with the PPI group to ensure that these were accessible.

8.4 Results

Fifty-five participants were included in the study: 20 patients (average age 47 [range 22-74], 10 female), 20 clinicians (14 physiotherapists, 17 female) and 15 managerial staff (11 female). Nine managerial staff consisted of managers situated within the Occupational Therapy and Physiotherapy Department and 5 managers who also had patient facing clinical care responsibilities. Six were managers situated across the entire hospital. The average interview length was 52 minutes [range 19 – 70 minutes]. All interviews were conducted over video call except for two patient interviews which took place over the phone.

The study interviews took place between September and October 2020, between the UK 'Lockdowns' 1 & 2 due to COVID-19. The patients within this study were forced to have VC due to the government restrictions and local Trust policy.

This study presents significant new data and performs an integrative analysis of this in relation to old data. The integrative analysis of previous and new insights are presented in Table 29 on page 182. Interview extracts of participants' perspectives may be found in Table 30 on page 190.

8.4.1 Summary of perspectives

The following three sections provides a general overview of the key perspectives from patients, clinicians and managers.

8.4.1.1 Patient perspectives

Patients reported several positives from being forced into using VC during COVID-19. For some, the use of VC saved several hours for their commute. This was described as better for patient living further away. Some patients had not tried VC before and were surprised at how well it worked. During the COVID-19 lockdown, some patients said they liked the excuse to leave the house and that by removing the option for a F2F they felt more isolated. In addition, patients worried about not being able to see their clinicians when they were in pain. Patients reported that VC was not acceptable when they felt they needed hands-on care.

Communication was challenging when there were technology issues that affected the sound quality of the VC. This impaired the relationship with their clinician and some patients felt that their therapist came across as less empathetic with audio and visual interruptions. It was felt that VC was not as accurate as F2F and in-person assessments provided a more holistic approach to care.

Patients felt that they needed to have the option of choosing VC or F2F and that it was important that this decision was not dictated to them. They requested information to help them make an informed decision about their care and suggested information leaflets and videos as a suitable way to share information. Patients also felt it would be useful to know how many appointments are available to them, so they could allocate a proportion of appointments for VC. Some patients were entirely committed to F2F because they felt this offered a superior service.

8.4.1.2 Clinician perspectives

Clinicians reported mixed experiences from VC during COVID-19. VC Was felt to be best when the patient is known to the clinician and a previous F2F assessment had already been undertaken; initial physical assessments were described as challenging when they were by VC. VC worked better when patients were familiar with the technology and understood how to work it. VC did not work as well when a clinician needed to undertake specific physical tests, like muscle testing or neurological tests. Clinicians also reported that in certain situations, such as first appointments after surgery, F2F was preferable.

At the time of these qualitative interviews, the therapists had seen many patients virtually. They explained that patients' choices and experiences were individualised, and this often depended on the objectives of the consultation. Some patients found VC easier, and some struggled to use VC. In situations where patients were not able to use the video equipment clinicians often abandoned this and converted to a phone call.

The hospitals response to COVID-19 meant that VC was rolled out at pace. Clinicians described a feeling of being 'thrown into it' when they were asked to undertake VC at short notice. At the outset of the pandemic, there was limited space and equipment available for clinicians which was challenging. The same was reported for patients working at home with their families; there were many reports of interruptions and at both ends of the call patients and clinicians needed a private space. Overall, VC was acceptable during COVID-19 but clinicians preferred F2F when physical examinations were required.

8.4.1.3 Manager Perspectives

Hospital managers during COVID-19 were extremely busy and were often faced with multiple problems at the same time. Managers reported a real pressure to keep hospital services open. VC was on the hospitals list of priorities and COVID-19 provided the catalyst for its accelerated implementation. The hospitals executive team had widely communicated that the roll out of VC was required to support patient care. The hospital invested heavily in video consultation equipment to enable this.

Uptake for video was reported as lower than for telephone consultations, which some managers found surprising. It was believed that video calls would be better because you could see the patients. As the pandemic continued however, there was a recognition that some people found video consultations challenging and many patients were unable to use this modality. Furthermore, the lack of space within the hospital due to the need for social distancing meant that capacity for video calls was much lower and clinicians occasionally had to use their personal mobiles to call patients away from their desks.

Managers described some of the challenges faced by clinicians; there was a national drive for VC and funding was made available to purchase videoconferencing equipment. Clinicians were provided with the opportunity to work from home, and they used their own devices from home were there was a shortage of hardware.

Not all clinicians were in favour of VC. Some clinicians had voiced their concerns about the safety and effectiveness of video calls. Where technical issues arose, clinicians grew frustrated with video calls. It was reported that some senior clincians were against VC altogether and refused to engage. Managers recognised that VC was not a replacement for F2F but that it was a useful solution during the pandemic. One manager [N4-5] described how for some clinicians *'virtual was part of the trauma of COVID.'*

Despite some of the negative elements, the roll out of VC was seen as a success by most managers. The hospital was under extraordinary pressure to reduce the footfall of patients through the hospital to reduce the spread of COVID-19. This was particularly important with the classification of the hospital as a 'Green' (COVID-19 free) site. It was recognised that the digitalisation of outpatient services was in keeping with NHS policy and hospital objectives. The use of VC allowed the hospital to continue to keep services running whilst being limited with the amount of patients that could enter the site.

8.4.1.4 Coding and integrative analysis of interview data

The above section provided a summary of the perspectives of patients, clinicians and hospital managers. The interview data were coded and characterised in relation to the previously identified factors that influence preference from our earlier research. New insights were identified during this process. The integrative analysis of data led to the identification of factors that shape the formation of patient preferences for VC and are described below. The knowledge underpinning these factors from our previous research and new empirical data within this study are presented in Table 29 on page 179.

8.4.1.5 The Context for the Consultation

The context for the consultation is the circumstances that form the setting. This includes the expected standards and rules of care (normative expectations), the expected ways patients and clinicians are organised and relate to each other (relational expectations), the degree to which features of the consultation meet the requirements of the consultation (congruence) and the access to material and cognitive resources to support the consultation (potential).

8.4.1.6 Normative expectations

Patients' expectations were founded on their previous experience of care. All patients within this study had experienced in-person physiotherapy before and were able to speculate about the effectiveness of VC. The requirements of the consultation provided a reference point to understand the way VC would work for them. During COVID-19, ‘stay at home’ became law and patients were satisfied with virtual care during this time and many were happy to not travel. The presence of COVID-19 led to VC becoming the only way to access rehabilitation for the majority of patients and during this time patients in this study preferred VC to no care at all.

8.4.1.7 Relational expectations

Patients had expectations about the ways patients and clinicians relate to each over during clinical interactions. Their previous experience of care provided a reference point to understand the changes in relationships with their clinicians over VC. Although many patients felt interactions over VC were inferior to F2F care, patients were willing to compromise and accept VC during COVID-19.

8.4.1.8 Congruence

The clinical status of the patient and the treatment required provided a point of departure to understand the ways the alternative consultation formats met their needs. Their needs could be shaped by a fluctuating clinical status, competing life demands, and the availability of healthcare. Each individual patient had varying degrees of ability to incorporate VC. Some patients found that VC was more easily incorporated into their life than an in-person consultation and would consider using VC in the future beyond COVID-19 because of this.

8.4.1.9 Potential

Patients access to resources shaped their ability to engage with virtual care. These resources included hardware (such as a phone, tablet or computer) and software (such as up-to date operating software and the platform to undertake a video call). During the COVID-19 pandemic, the platform *Attend Anywhere* was made available across the NHS in England. Resources were made available to patients to support the use of video calls.

8.4.1.10 The implementation process of VC

Participants within this study were not offered the choice of a F2F consultation and all had to implement VC (either a telephone call or a video call with their clinicians). In these circumstances, a process of implementation took place. NPT provided the framework to build on previous iterations of the CONNECT Project to explain the implementation process for patients.[50]

8.4.1.11 Coherence

Patients needed to understand the differences between VC and F2F. This was challenging during the pandemic when the introduction of VC was accelerated and individuals had no prior experience of VC. Clinical and administrative staff supported patients to understand the role of VC. The capabilities of VC were seen to be limited where an in-person intervention was required, such as when hands on-manual therapy or facilitated exercises were required. If a patient was concerned about their problem, they often felt that a thorough F2F assessment was preferable to a VC.

8.4.1.12 Cognitive Participation

In general, patients who found F2F attendance challenging were more committed to VC. For some, a traditional F2F appointment took significant planning and left the patient in pain due to their travel. Commitment was enhanced the more congruent VC was for the patient. Many patients were concerned about catching COVID-19 through travel to hospital and this made the option of a VC preferable. Patients' willingness to use VC was shaped by their understanding of the benefits.

8.4.1.13 Collective Action

VC rehabilitation was challenging in the home environment for some patients. It was not possible to conduct the range of interventions that were often needed if the patients video device was not portable. Mobile devices were helpful if, for instance, a patient had to film themselves walking up stairs or an occupational therapist needed to observe functional activities in the kitchen. Patients had to convey their symptoms over VC without the clinician being able to physically touch them.

The 'work' required of patients and clinicians over a VC was different to the 'work' of F2F care. Some patients and clinicians did not have the technical skills required to be able to use VC. Family members often supported patients with VC activities. Clinicians occasionally needed to teach patients the required computer skills over the phone. The burden of VC shaped preferences for ongoing use of VC.

8.4.1.14 Reflexive Monitoring

Patients were forthcoming with feedback about their experiences. Clinicians also discussed their own experiences to shape to the virtual service. For instance, after several clinicians encountered technical challenges that interfered with the delivery of a VC, the virtual slots were increased from 30 minutes to one hour. Patients valued the extra time with their clinician and found this aspect of the VC to be beneficial. In response to these technical problems, clinicians made it clear to patients, at the start of a video call, that they would contact the patient via telephone if the VC cut out. As patients and clinician dyads experienced both VC and F2F, they were able to plan long term management which often included the use of both VC and F2F.

Patients had set expectations about their own progress and were reluctant to engage a modality if they felt it was less effective than their preferred option. If a patient felt their progression was slower virtually, they preferred a F2F appointment. Some clinicians felt virtual assessments were less accurate than F2F; this viewpoint was further confirmed at follow-up F2F appointments if a patient presented in a worse physical condition than was anticipated.

Table 29 Integrative analysis of interview data

Insights from the CONNECT Project research before COVID-19 carried forward	**New insights from this research after COVID-19**	**Integrative Analysis**	
		New sub construct	**New Construct**
Expectations[99] - Experience of previous care. - Perceived requirements of the session.	**Normative Expectations**[70] - Perceived safety and effectiveness of VC. - Expectations about changes to the norms, rules and resources as a result of working with interventions and their components.	Context (1) **Normative Expectations**	**Context** for the consultation *(the circumstances that form the setting for the consultation)*
Interactions[98] - The expected and actual change in interactions due to VC.	**Relational Expectations**[70] - Perceived communication through VC use. - Changes to the ways that people expect to be organised and relate to each other as a result of working with interventions and their components.	Context (2) **Relational Expectations**	

Situation[99] - The clinical status of the patient. - The treatment and management required. - The availability of healthcare to the patient. **Expectations**[99] - The psychological status of the patient and the impact of VC delivery. **Demands**[99] - Competing life demands **Context for the consultation**[100,191] - Pathway related factors. - Clinical and symptom related factors. **Requirements of the consultation**[100,191] - Objective factors. - Interaction factors. **Requirements**[98]	**The usefulness of VC** - An understanding of the ability of VC to meet the needs of the appointment through experiential use. - Ability to determine whether it was able to 'fit in' with their lifeworld. **Plasticity**[70] - The extent to which interventions and their components are malleable and can be moulded to fit their contexts. **Elasticity**[70] - The extent to which contexts can be stretched or compressed in ways that make space for interventions and their components and allow them to fit. **External processes and events that shape patients access to resources to support VC**[69] - During COVID-19, the option of in-person care was removed and the only option was VC.	Context (3) **Congruence**	

- How the new processes required of VC (such as engaging from different places) fit in. **COVID-19**[191] - The impact of COVID-19 on the delivery and availability of healthcare.			
Capacity[99] - Financial resources - Access to material and informational resources. - Support available through networks - Sources of healthcare capacity. **Patients access to resources**[100,191] - Socioeconomic factors. - Access to, and willingness to engage with, VC. **Resources**[98] - Ability to achieve the logistics of getting to a F2F or VC.	**Internal processes and events that shape patients access to resources to support VC**[69] - Patient's access to hardware (such as phone or computer), up to date software to run the VC platform, adequate internet speed, the required rehabilitation equipment, the required space for rehabilitation and an understanding of how to get the most out of rehabilitation in the home. **Internal processes and events that shape clinicians access to resources to support VC**[69] - Clinicians access to hardware and software and a confidential space to undertake a VC.	Context (4) **Potential**	

- Time available for care. **Environment**[98] - Setting for physical rehabilitation. - Setting for virtual rehabilitation. - Access to hardware and software.	**Individual readiness**[69] - Patient and clinician readiness to translate individual beliefs and attitudes about VC into behaviours that are congruent, or not congruent, with (new) system norms and roles. **Shared Commitments**[69] - Patient and clinician readiness to translate shared beliefs and attitudes about VC into behaviours that are congruent, or not congruent, with (new) system norms and roles.		
Expectations[99] - Patient beliefs about the capability of VC.	**Coherence**[50] - Coherence building that makes VC and its components meaningful: participants contribute to enacting intervention components by working to make sense of its possibilities within their field of agency. They work to understand how intervention components are different from other practices, and they work to make them a coherent proposition for action.	Implementation Process (1) **Coherence**	**Implementation Process** *(The translation of strategic*

	Cognitive Participation[50] - Cognitive participation that forms commitment around VC and its components: participants contribute to enacting intervention components through work that establishes its legitimacy and that enrols themselves and others into an implementation process. This work frames how participants become members of a specific community of practice.	Implementation Process (2) **Cognitive Participation**	*intentions into routine practice)*
Demands[99] - The requirements of VC. **Work**[98] - The required skills and expertise for successful VC.	**Collective Action**[50] - Collective action through which effort is invested in VC and its components: participants mobilise skills and resources and make VC workable. This work frames how participants realise and perform VC components in practice.	Implementation Process (3) **Collective Action**	
Demands[99] - The things people need to do as a consequence of choice.	**Reflexive Monitoring**[50] - Reflexive monitoring through which the effects of VC and its components are appraised: participants contribute to enacting	Implementation Process (4)	

	intervention components through work that assembles and appraises information about their effects and utilise that knowledge to reconfigure social relations and action.	**Reflexive Monitoring**	

8.4.2 How preferences for VC are decided

Patient expectations provided the point of departure to make sense of the alternative consultation formats. These sense-making activities shaped their willingness to implement the alternative consultation options. Patients had an awareness of what was required from the consultation and were able to determine whether a VC or a F2F would be a helpful format to achieve what was required. In this study, patients placed emphasis on the relational aspect of their care, whereas clinicians and managers placed more emphasis on the normative expectations of care. Patient expectations about the norms, rules and relationships with clinicians shaped their ability to implement the alternatives, which affected the way the alternative options were appraised.

Patients' ability to accommodate the consultation options shaped the way in which they made sense of their responsibilities and the value of the alternatives. Patients would determine whether a VC met their needs and this shaped their willingness to implement one format over another. During the pandemic, it was found that a traditional length consultation required additional administration for therapists, and this influenced clinicians' ability to do the required tasks to meet the objectives of the consultation. If a patient could successfully undertake a VC, this made available additional time and resources to spend doing usual day-to-day tasks because of the avoidance of travel. Patients and clinicians were able to determine the success of the consultation in relation to it meeting their needs and fitting in with their life. This shaped the way in which they appraised information about the alternative formats.

Patients' access to material and cognitive resources shaped the way in which they made sense of their responsibilities and the value of the alternatives, as well as their willingness to implement them. There was recognition that different individuals would have different access to resources. It was this level of access which shaped patients' ability to do the work of the alternatives. Some patients had access to adequate broadband and a device to be able to undertake VC and some had access to equipment and the space to be able to complete their rehabilitation in the home environment. Without these, successful implementation of VC was not possible and patients were more likely to prefer a F2F.

8.4.3 How preferences for VC are organised

Patient preferences were formed in the context of clinician and organisational preferences. The clinicians within this study were required to implement VC at pace which required restructuring of policies and procedures. For many clinicians, the addition of VC worked well whereas for others VC was inferior to F2F.

The organisation invested heavily in resources for clinical staff to be able to undertake VC with patients. These additional resources shifted the context for clinicians in favour of undertaking VC. Patients arrived at the point of care with an established context of care; they had set expectations about what the norms and resources of care are and the relationship to their clinician. The congruence of the alternative care options and their access to cognitive and material resources were fixed and available alternatives for patients were restricted. When a clinician did not think that a VC would work, they would suggest a F2F which influenced the patient’s sense-making of the alternatives and their commitment to VC. The work of implementing the alternatives for patients was shaped by the resources they could bring to bear; if they did not have access to adequate equipment, they were unable to do the required work to implement VC. In some circumstances, clinicians did not believe VC was appropriate.

Organisation and clinician context, the restricted availability of alternatives and the implementation process directly influenced patient preferences and decision making.

Table 30 The mechanisms contributing to the formation of patient preference for VC

Key: C = clinician participant; N = non-clinical manager participant; P = patient participant

Mechanism				
Normative expectations *(The expected norms and rules of the consultation)*	**Relational expectations** *(The expected ways patients and clinicians relate to each other)*	**Congruence** *(How features of the consultation meet the requirements of the consultation)*	**Potential** *(Access to material and cognitive resources)*	**Implementation Process**
No, I think it's far more effective to have a face-to-face. They do as best they can, but there's limitations to having a 2D camera and being able to see in 3D, which obviously we see in 3D. **[P4-2]**	*I have been to a physio appointment before in another hospital and they did a whole assessment of my muscle strength and muscle balancing et cetera which is obviously not possible remotely.* **[P4-1]**	*If I came in to see her, she wouldn't do any more. She would physically maybe touch me a little bit, but she wouldn't give me a massage or anything like I would ask her for. So it's not like there'd be any real gain for me physically by coming in. I would be a lot worse, just*	*That I think is the nub of this is that I'm - in my position I'm quite happy with it but other people may feel they want to use equipment. Whether it's exercise machinery or a ball to sit on and get balancing or I don't know what else. What other equipment do you have in*	**Coherence** *(The work patients and clinicians do to make sense of the alternative consultation options)*

Can I do my rehabilitation virtually? Well, I don't know. You're the expert, you tell me. Yeah. I think if there was more information about - if it was rephrased and said how do I do my rehabilitation virtually? It's like well we do this, this and this. Then - yeah. Then I'm like okay, well they've thought about it, they know what they're doing, and this is what we're going to do. **[P4-19]**	*There will be some where you absolutely, it's very straightforward, it's a straightforward pathway, you can easily do your first appointment virtually and that will be safe, through to those where you just could not do that because you've got to put your hands on, you've got to examine the person, you've got to watch them walk, et cetera.* **[N4-1]**	*because I'd have to have driven and waited.* **[P4-17]** *There are challenges with the initial assessment. With trauma patients I think you do pick up a lot about what's going on with them psychologically. Trying to pick that up on the screen is quite hard. So our pathway will probably stay the same for those initial face-to-face consultations.* **[N4-10]**	*a physiotherapist department that you can't replicate at home? I mean that's the question I'm asking.* **[P4-7]**	

Mechanism				
Normative expectations *(The expected norms and rules of the consultation)*	**Relational expectations** *(The expected ways patients and clinicians relate to each other)*	**Congruence** *(How features of the consultation meet the requirements of the consultation)*	**Potential** *(Access to material and cognitive resources)*	**Implementation Process**
Based on my experience I think that I would like to have or to see maybe a first face-to-face in person assessment where maybe you can do other things that you cannot do virtually. Then, I think once decided is to have the choice of having the virtual follow-ups possibly. **[P4-1]**	*As I say, if I had only ever had virtual physio, so I'd seen the physio once in hospital and all the others were virtual, I wouldn't have felt as close.* **[P-14]** *I think you get a lot more honesty in person.... When there's emotions and that involved, I think you get more*	*Virtual's worked around my childcare, because on Fridays I have my little one with me. If I had to start coming into hospital every Friday, I'd have to kind of source that childcare, make space for that hour journey to the hospital, while I'm waiting and then back again. For me, the difference between virtual and face-to-*	*The convenience is unreal. When you go to work four days a week, and you then you have to go to the hospital, come back, and I've got a kid as well, do you know, to fit everything around and travel back and forth, because the hospital for me is normally like an hour journey.* **[P4-6]**	**Cognitive Participation** *(The work patients and clinicians do to invest commitment into the alternative consultation options)*

I swing from feeling like, no, this is a really unsafe way to work, we've got safeguarding, we've got suicide risks, all this kind of stuff, to then thinking, actually I'm sure there's some services that must be doing this and it's fine and we have systems to - you have SOPs set up, how to contact safeguarding, how to contact people who assess suicide. **[C4-13]**	*- you get build a better relationship because that person is seeing you for real.* **[P4-17]** *I think it's a lack of feeling that someone else is there that actually cares about you, by doing things virtually.* **[P4-15]**	*face is a big three-hour difference of time. I can have my virtual appointment over the phone wherever I am, set up and go with it, and be done within half an hour, 45 minutes.* **[P4-6]**	*I think, from therapists, a fear of losing space. If we don't fill those face-to-face cubicles, what will happen? Will we lose that space? Will it then be taken away from us? Again, it's that balance, isn't it? That reassurance that you're not having - if we go one way, we're not going to be pushed that way.* **[C4-6]**	

Mechanism				
Normative expectations *(The expected norms and rules of the consultation)*	**Relational expectations** *(The expected ways patients and clinicians relate to each other)*	**Congruence** *(How features of the consultation meet the requirements of the consultation)*	**Potential** *(Access to material and cognitive resources)*	**Implementation Process**
If you were to do the physio with me, imagine I've got this laptop, I'm on the bed, the laptop's moving around and I'm trying to lift the lead and then, show me your knee. I'm trying to hold that to show them **[P4-4]** *But actually one thing that has come up to us from a*	*I remember I was moving from the sofa to by the window and sometimes I'd have to sit on the floor, just so the physio could see different bits of me. Then if they wanted to see me walking, then that's - well I don't know how well they could see me, but I imagine that it would be quite difficult.* **[P4-18]**	*I live in [x location], so actually coming up to [x hospital] is a bit of a palaver and it's at least three hours on the train for me to come up. Six hours for an hour appointment or half an hour appointment is a bit of a trauma.* **[P4-13]** *At the beginning because there was so much administration,*	*To get someone to try and get their phone round their back and show you where the pain is, that's the limitations that happen right here. You don't know if people have got access to someone else to hold to their phone for them while they turn around.* **[P4-6]**	**Collective Action** *(The work patients and clinicians do to operationalise the alternative consultation options)*

team lead perspective has been about male therapists working with teenage girls, for example, and having to kind of get things [policies] in place. **[N4-12]**	*But it just kept cutting out, but I'm not sure whether that's her connection or whether it's my end connection. It was kind of annoying. But if it cut out she'd phone me or, as I say earlier, we started doing [x software], and it sort of worked better and did the trick. So [x software] worked better.* **[P4-16]**	*and it completely depends on the therapist. One therapist will need more time to do admin stuff. I think we were trying to be quite gracious and give more time because it's also been, obviously because of the pandemic, a really stressful period and we're just - we haven't treated 12 patients or 15 patients a day. So, I think slowly we'll build that up. I think yeah, we've been more cautious.* **[C4-16]**	*When things go very well is that they have somebody else to film for them. They have space. They've organised the area. They have dressed appropriately, and they have prepared well. They've got adequate space in their home environment.* **[C4-7]**	

Mechanism				
Normative expectations *(The expected norms and rules of the consultan)*	**Relational expectations** *(The expected ways patients and clinicians relate to each other)*	**Congruence** *(How features of the consultation meet the requirements of the consultation)*	**Potential** *(Access to material and cognitive resources)*	**Implementation Process**
What I need to make sure to keep in mind not to do them wrong. Make sure you keep your knee and ankle aligned and look at myself in the mirror et cetera. Yeah, understanding what I have to do, I think is a successful consultation. ***[P4-1]***	*I feel like I'm being held back just a little bit. I've gone from taking strides and going forward and I feel like I've gone back to baby steps a bit. That's not anybody's fault, it's just the situation.* **[P4-4]** *A prime example is when I was telling [x physiotherapist] about, when I had done a lot*	*Like I say, I can't put a price on the time I've saved throughout all my hospital appointments. Six weeks of virtual has saved me probably 40 hours of travelling. When you work out how much time I would have spent – that's not even including petrol. So yeah, it's priceless.* **[P4-6]**	*I mean like correcting someone's movements you can do it over the video, but I'm not sure how accurate that it. It could be accurate if the video quality is good, but less maybe if it's not that great. What else? I'm not sure.* **[P4-1]** *You're reliant on someone's ability to be able to use the*	**Reflexive Monitoring** *(The work patients and clinicians do to appraise the alternative consultation options)*

I thought they were in this place and I thought they were doing this and exercise z and I saw them and they were worse than I thought they were. That has also frightened people – therapists I guess, thinking that, oh I thought they were better. **[N4-5]**	*of exercise or walking, I get an actual limp on my right leg, where my leg gives up a little bit. I really wanted to show her, but it was impossible to show her over the [x software], and that's why we left that as, next time I come in, I'll show you that.* **[P4-6]**	*What didn't work well was a chaotic environment at home, so other children involved would be just chaos.* **[C4-4]** *One of those patients is coming back to see us as an outpatient, as a face to face. I don't think that it did meet her needs, actually, from a pain - I think she needed to be taken out of her environment which is quite challenging, quite chaotic, and quite toxic at times.* **[C4-12]**	*technology before you even get to know them.* **[P4-6]** *So a couple of times I've had to mute [x software] and I've had to call their home phone. So I can hear their voice and see them on the screen.* **[C4-1]**	

8.5 Discussion

This qualitative interview study is underpinned by NPT[50] and Preference Theory.[5] This research has extended the findings of our previous research through an investigation into patient, clinician and manager experience of the accelerated implementation of VC.

8.5.1 Strengths and Limitations

A strength of this research is the cumulative abductive identification of insights through the different phases of the CONNECT Project, before,[98-100] during [31,96] and after the COVID-19 pandemic. The resulting model is the result of a pragmatic, real-world investigation into the implementation of VC in practice. Whilst we offer statements that may aid prediction of preferences, further research is needed to understand their relative importance.

This study was conducted at a specialist London Hospital and focussed on orthopaedic rehabilitation and may not have applicability to other centres. To overcome this, a qualitative abductive analysis was conducted to identify more general factors that influence preference to allow for transportability within settings.

The lead researcher (AWG) is a healthcare professional within the centre which could have limited the results through local participant familiarity. To mitigate this, patients who had a previous existing relationship with AWG were excluded from the study. It was not possible, however, to exclude clinical staff, most of whom were known to AWG. *As a clinician within the department, AWG had prior knowledge of the departments procedures. Furthermore, AWG had worked with many of the clinicians and managers during the accelerated implementation of VC within the department. Prior knowledge of clinically delivering in-person rehabilitation and the implementation of VC may have influenced data collection (through semi-structured interviews).*

An abductive approach to data analysis relies on the interpretation of data to facilitate meaning making. As an active clinician, embedded within the department, AWG was uniquely positioned within this research study. AWG's previous experience of delivering in-person rehabilitation, of supporting the roll out of VC during COVID-19 provided the backdrop for data analysis. Other researchers from different backgrounds will have let to different interpretations and ultimately different results from the research.

Clinical staff were asked to identify patients for the study, it may be that patients who were 'against' VC were unwilling to enter the study and their viewpoints missed. Alternatively, participants may have had strong views in favour of VC and this is why they entered into the study;

responses may have been biased in favour of VC. Clinicians were not provided with training on how to recruit, this aspect of recruitment relied on an assumption that clincians were aware of the aims and objectives of the study. Any misinterpretation of the aims and objectives may have influenced findings.

Within the host site, the accelerated implementation was viewed by the executive team as a success. Views of clinicians and managers may have been influenced by this and responses to interviews may have been biased in favour of VC. Wider recruitment at other centres may have led to different interpretations.

Data analysis was undertaken using a combination of NVIVO and Microsoft Excel. This was a pragmatic decision that was taken because of the unreliable nature of the computer available to the researcher. The data went through a process of defamiliarisation; attributions for each data point were orientated into a taxonomy within Microsoft Excel to facilitate model development. This process made the orientation of the data easier to process within Excel rather than NVIVO, but it did mean that the theorising took place one step removed from the interview data, which may have impacted on the interpretation of findings.

The sample size for the study was decided prior to the start. 20 patients, 20 clincians and 15 managers were selected to provide as large a pool of data as possible within the scope of a PhD project. Although a large volume of data were collected, the diversity of data was limited to the fact that this research study was undertaken at a single specialist hospital. Had the interviews been analysed sequentially, rather than after the completion of data collection, insights from the earlier interviews would have had the opportunity to be probed at later interviews to further extend and challenge these insights. Although the pragmatic decision to select participant numbers a-priori, a data driven approach may have led to different interpretations and results from the study.

This investigation into patient preferences sought the experience of participants who did not always have a choice of consultation format due to COVID-19. A limitation of this study is that the construction of preference in the context of COVID-19 may not be representative of a post-COVID world. Although the research was conducted at only one site, the variety of patients, clinicians and managerial staff included in the study provided a range of perspectives and context to support the development of the model. The use of Normalisation Process Theory provided focused attention towards key implementation factors that feed into the formation of preference.

8.5.2 Mechanistic model of preference formation

Here, we present a theory of preference formation. A visual model to illustrate the formation of preferences has been developed from the integrative analysis and can be seen in Figure 14 on page 203. We consider the formation of patient preferences as a mechanism. Our position is that patient preferences are the product of a total subjective comparative evaluation of the available options. The context for the consultation (normative expectations, relational expectations, congruence and potential), the available alternatives and the implementation process (coherence, cognitive participation, collective action, and reflexive monitoring) are all involved in shaping the total subjective comparative evaluation. These are the key entities that are linked to one another to form the construction of patient preferences.

8.5.2.1 Consultation Context

Each individual patient context will present unique potential to incorporate either a VC or a F2F for a clinical appointment. For some patients, the use of a VC will be burdensome; for others, the introduction of VC will be beneficial. Patients will need to have access to specific resources (the required hardware, software and skills to use these[110]) to have a VC, particularly if VC are enforced. Patients will also need to be prepared to accept the change in their roles and responsibilities through VC use. A patient’s context is formed through the interactions between the level of resources they have at their disposal (their potential capacity), the degree to which the features of the consultation fit in with the circumstances (the congruence of the consultation alternatives), their expectations of what standard rehabilitation looks like (their normative expectations) and their expected interactions with their clinician (their relational expectations) of enrolling in a F2F or VC. If the patient context lends itself to one consultation being more beneficial than the other, they will prefer the most beneficial consultation.

8.5.2.2 The implementation process of VC and F2F

The patient context dictates the work required of patients to implement the available alternatives. Patients need to make sense of the differences between the consultation formats and build an understanding about the potential alternatives. Clinician and Organisational sense-making shapes patient sense-making. Patients must invest commitment and engage in the process of determining which alternative is more beneficial and define what they need to do. Each alternative will require different tasks and patients may need to acquire new skills. Patients need to collect and appraise information about the effects of each consultation alternative. These mechanisms are underpinned by the patient context. The implementation process shapes the total subjective comparative evaluation of the alternatives.

8.5.2.3 The formation of preference

A total subjective comparative evaluation is undertaken by the patient. The patient will consider all the available information and choose the alternative which brings them the most benefit. The patient will prefer the option that yields the most benefit.

8.5.2.4 The consequences of choice

The choice a patient makes will have a range of consequences on their context, their implementation process, and their overall preferences. The outcomes and consequences will differ for each individual patient, as this is all dependent on their individual context.

A patient is more likely to implement a preferable alternative of care. This understanding of the mechanisms that influence preference formation is helpful to understand implementation processes.

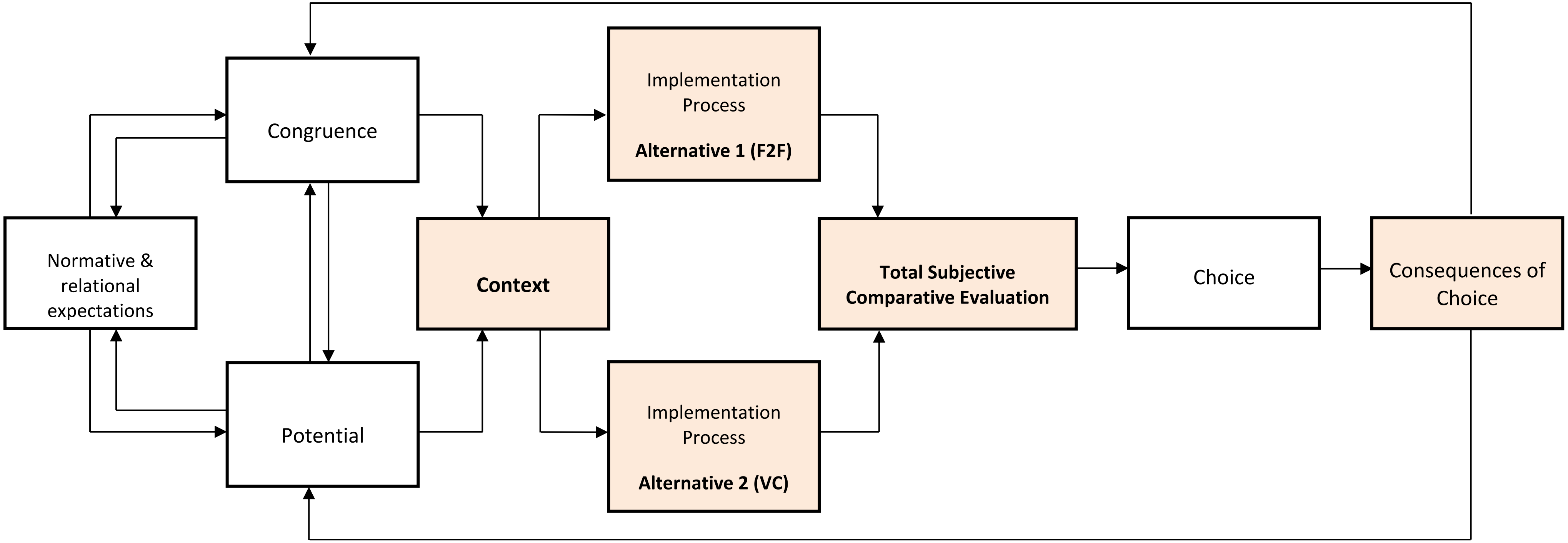


Figure 14 Model to explain the construction of patient preferences

8.5.3 Results in Context

This present research study builds on the previous insights gained from earlier phases of the CONNECT Project[98,99,100,191] to understand how patient preferences for VC have changed during the accelerated implementation of VC during the COVID-19 pandemic.

The COVID-19 pandemic led to restructuring of normative and relational expectations of care. The emergency nature of care led to a shift in the perceptions of how healthcare should be judged. Whilst many patients acknowledged, within this study, that ordinarily they would have preferred in-person care, they were satisfied and grateful for the opportunity of VC as the only option for rehabilitation. Even if in-person care was available, the introduction of the national lockdown restricted in-person care and some were unable to travel because of medical reasons. For these patients, VC via telephone or video was the only option and VC was preferable to the alternative (no care).

Healthcare organisations in England were provided with a platform to deliver VC. Organisations invested effort to help patients to understand the role of VC.[195] Resources that aid sense-making, such as our previously developed sensitising questions to aid preference formation,[99] are likely to help patients understand the value of VC.

Historically, standard care demanded in-person rehabilitation appointments. For most patients in this study, the standard of care became VC during the pandemic.[31] Patients and clinicians developed skills and expertise with virtual interactions. Patient and clinician sense-making and commitment to VC improved during the pandemic and clinicians provided ongoing support for patients to make the demands of care easier. Patients valued the support of clinicians and administrative staff to understand how VC worked and for their assistance with technology problems.[96]

The implementation of VC may pose several challenges for patients. For example, people with disabilities are less likely to have suitable infrastructure.[196] Within this present study, this infrastructure included access to hardware and up-to-date software and the space to undertake rehabilitation in the home environment. If a patient cannot undertake a VC because of a lack of infrastructure, they are more likely to value an in-person consultation.

The use of VC may be more challenging for patients with communication barriers, patients with a lack of education, those with language or literacy barriers, or those with intellectual disability.[196] Patient satisfaction is positively associated with technical performance,[197] and in our study clinicians often had to support patients with technical challenges. Some patients did not possess the technical skills to use VC,[31] which reflects the nationwide picture.[110] Whilst this clinician support may have a positive impact on patient experience, this will reduce the overall resources of the clinical team to be able to provide rehabilitation for patients.

Communicating over VC placed greater emphasis on verbal communication skills during these interactions.[198] Failed VC was deemed to occur when there were issues with communication.[37] In addition, clinicians needed to be able to trust the VC - many orthopaedic professionals lost confidence with virtual calls when issues arose.[199] Clinicians normative expectations of undertaking a thorough hands-on assessment was important, many feared missing sinister pathology and screening of 'red flags'[200] or 'safety netting'[201] may be a useful way to overcome these concerns. People need to commit to using VC, sharing of good news stories[96,202] might help influence the views of clinicians who are reluctant to engage with telehealth.[172]

Shared decision making, where clinicians and patients make decisions in partnership using the best available evidence, must be considered in the light of different power relationships. The Agency model of power[203] suggests 'ontologically autarchic' individuals hold power. In the context of a patient and clinician relationship, the clinician (situated within the organisation) is perceived as having power while patients perceive themselves as relatively powerless.[204] Power is exercised *'through the subordination of others' preferences and the extension of one's own to incorporate these others.*'(p9)[205]

Organisations and clinicians have a role in helping patients to understand the role of VC and some of the ways in which organisations and clinicians can influence patient preferences are shown in Table 31 on page 394. The application of preferences and decision making may take place as a shared decision, where patients and clinicians have equal power, or the more powerful individuals may exert their own preferences to enable preferable outcomes (Figure 15 on page 206). Consideration of these mechanisms will facilitate shared decision making in practice.

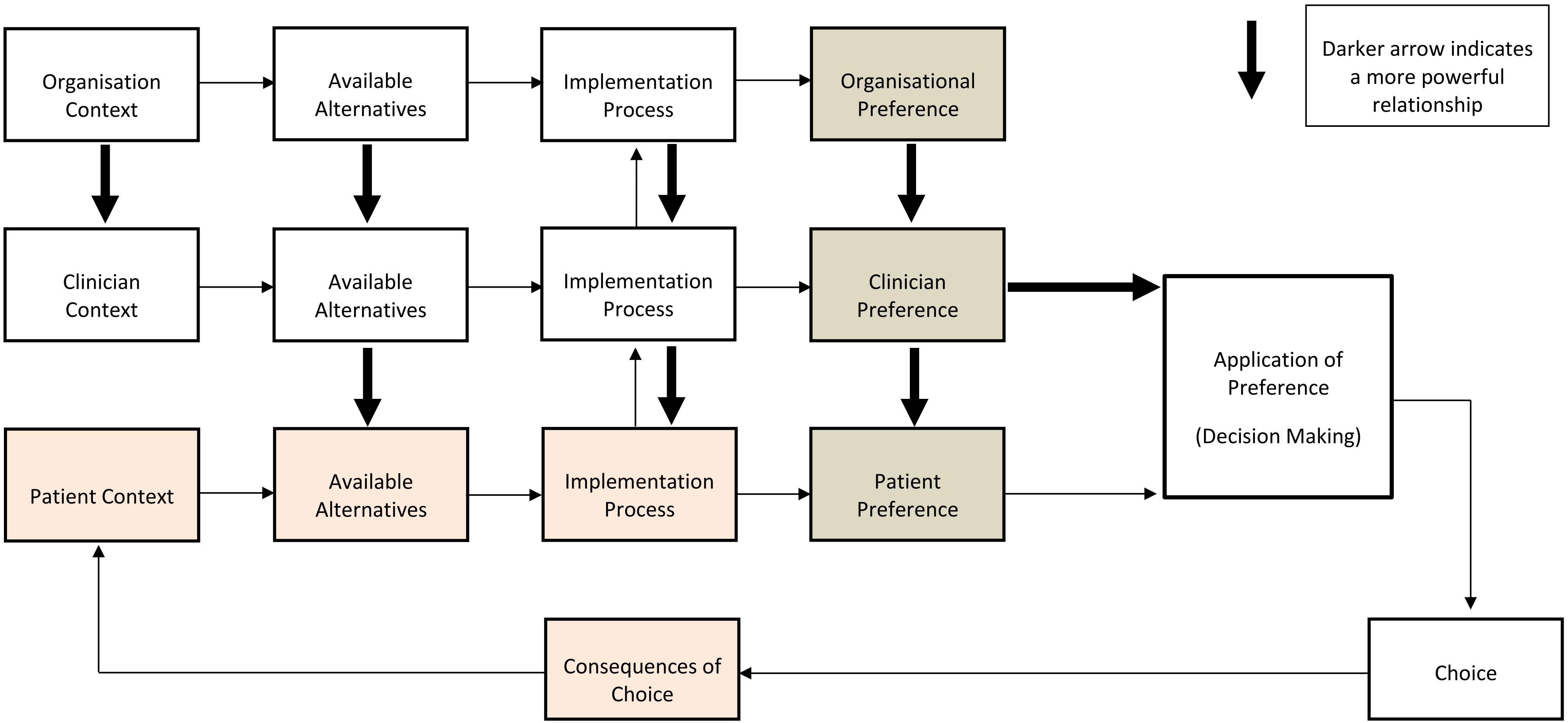


Figure 15 Map of empirical data of patient preferences in the context of organisational and clinician preference

Table 31 The impact of organisation and clinician preferences on patient preferences

Mechanism	**Impact of organisation and clinician preferences**
Normative Expectations	Establish the norms and rules for care
Relational Expectations	Establish the ways in which patients and clinicians are organised and relate to each other
Congruence	Can restrict or develop care pathways that are more easily accommodated in the patient's lifeworld
Potential	Can withhold or provide access to material and informational resources to patients
Coherence	Can frame the ways patients make sense of the alternative consultation options
Cognitive Participation	Can withhold or support patients to invest commitment into the alternative consultation options
Collective Action	Can make it harder or easier for patients to operationalise the alternative consultation options
Reflexive Monitoring	Can frame the ways patients appraise the alternative consultation options

The NHS Long Term Plan[4] set out a vision for a digital NHS but the COVID-19 pandemic led to a 'big bang' of technological change[169] where services rapidly converted F2F to VC in line with government guidelines. The timescale for the relaxation of social distancing restrictions in the UK remains uncertain; the capacity for F2F clinics will continue to be reduced during this period. Predicted modelling suggests up to 28 million operations were cancelled or postponed globally during the first wave of COVID-19[206] and orthopaedics is now facing a huge backlog of surgical cases.[207] There is likely to be an ongoing reliance and pressure to use VC as remote consultations have been touted as a potential way to increase capacity in orthopaedics.[208] This pressure will continue to influence clinician and patient preferences. Healthcare must, therefore, be sensitive to clinician and organisational preferences. Clinicians need to develop sensitive ways to manage the 'arenas of struggle'[209] between high and low powered individuals when preferences are incongruent. Agreement between healthcare professional and patient preferences are more likely to lead to successful uptake and adherence to modalities that patients conclude to be more beneficial.

Within our theoretical model, a patient will prefer the alternative that brings the most benefit. Patient preferences are shaped by the context of the consultation and the implementation process of the alternatives. Whilst this theoretical model was underpinned by empirical data of virtual orthopaedic rehabilitation consultations, this model is transportable to other areas of healthcare. It can be applied across a range of domains of healthcare delivery format, which may include preferences for virtual appointments across other sectors of healthcare, or preferences for different treatment modalities. Such a model could also be used to explain the empirical challenges of adherence to treatment regiments and management programmes when patients are offered a choice.

8.6 Conclusions

This was an empirical investigation into the experiences of patients, clinicians and healthcare managers during the accelerated implementation of VC during COVID-19. This study has explained patient preferences through the accumulation of several pieces of work as VC changed from an experimental clinic to a compulsory form of service delivery during the COVID-19 pandemic. The study presents a robust conceptual model of preference formation.

Patient preferences are decided in the form of a total subjective comparative evaluation of the implementation process of the available options for care. The implementation process of investing meaning, commitment, effort, and comprehension into the available options informs the total subjective comparative evaluation and the formation of preference. The preferences of clinicians and the organisation also need to be considered as these can mediate patient preferences. Since decision making will take place in the context of patient’s, clinician’s, and organisation’s preferences, future pathway design should be sensitive to patient preferences whilst acknowledging the preferred outcomes of clinicians and organisations.

8.6.1 Ethical approval and consent to participate

Ethical approval was received for this study (Approval received 4th December 2018 from the South Central-Oxford C Research Ethics Committee [IRAS ID: 255172, REC Reference 18/SC/0663). An amendment was made to investigate experiences of VC on 7th April 2020. All participants were provided with a participant information sheet and given at least 24 hours to consider the information and ask questions before being recruited into the study. All participants provided informed, written consent prior to enrolment.

8.6.2 Acknowledgements

The authors thank members of the CONNECT Project Patient and Public Involvement steering group for their invaluable contributions to the overall study design of the CONNECT Project and obtaining funding for the PhD Fellowship. The authors also thank John Doyle, Rachel Dalton, Anju Jaggi, Iva Hauptmannova and colleagues within the Therapies Directorate and Research and Innovation Centre at the Royal National Orthopaedic Hospital for their ongoing support. The authors are grateful to the 20 patients and 35 members of staff who participated in this study.

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8.6.4 Author Contributions

AWG wrote the paper and conceived the project with CRM, JJ and MS. CRM guided qualitative data collection. AWG conducted all the interviews. CRM assisted with data analysis, and with AWG developed the model. CRM, JJ and MS edited and critically revised the paper. All authors have read and approved the manuscript.

Chapter 9 Discussion

Virtual Consultations (VC) in healthcare have been investigated in research programmes for several decades.[210-212] Several of these funded programmes of research into VC were delivered within the United Kingdom (UK) and the Virtual Outreach Project[15] and PhysioDirect.[102] Despite the evidence suggesting VC is effective[213-215] and acceptable to patients and clinicians,[48,49,216,217] uptake in clinical practice continued to remain low across the National Health Service (NHS) in the UK up until 2020.

Policy-makers are enthusiastic about the use of digitally-mediated healthcare. The NHS *Five Year Forward View*, published in 2013,[13] set out a vision for the future of the NHS. The report highlighted the opportunities for digital; despite 86% of adults being able to access the internet in the UK, only 2% of patients used the internet to contact their GP. The report called for family doctor appointments to be available on-line everywhere. The *NHS Long Term Plan,*[4] published in January 2019, set out a ten-year vision for the NHS to make it fit for the future. Digital care was central to the Long Term Plan; a target was set for digitally enabled primary and outpatient care to go mainstream across the NHS within ten years.

The COVID-19 pandemic rapidly transformed the healthcare landscape. On 31st December 2019, the World Health Organization (WHO) was informed of an outbreak of pneumonia, of unknown cause, in Wuhan City in China.[218] The genetic sequence of the unknown virus was subsequently identified as a novel coronavirus. The Pan American Health Organization / WHO Regional office for the Americas (PAHO/AMRO) issued an epidemiological alert on the novel coronavirus on the 16th January 2020. This called for enhanced infection control measures such as contact and droplet precautions for individuals suspected of having the virus, adequate ventilation, regular cleaning of surfaces and one metre social distancing.[219] The first case of COVID-19 was reported in the UK on the 31st January 2020.[220] The WHO characterised COVID-19 as a pandemic on the 11th March 2020.[221]

COVID-19 had a significant impact across society in the UK. Following the classification of COVID-19 as a pandemic, the UK Government released guidance via the Gov.uk website[222] that requested households with possible or confirmed COVID-19 to ‘stay at home’ to avoid spreading the virus. Schools were ordered to shut[223] and businesses such as pubs, cinemas, theatres and casinos were forced to close on 20th March 2020.[224] The UK Prime Minister, Boris Johnson, ordered a national lockdown on the 23rd March[225] and the UK public were requested to stay at home unless they were identified as ‘key workers’ or for ‘essential travel’. On 24th March the Health Secretary at the time, Matt Hancock, announced the construction of the first of several field hospitals at the ExCeL

Centre in East London to support the NHS to deliver care to people seriously ill with COVID-19.[226] Within a fortnight, the UK Prime Minister was admitted to a London Hospital Intensive Care Unit with worsening symptoms of COVID-19[227] and the London Nightingale Hospital received its first patients.[228] During this time, news stations and social media were flooded with information about COVID-19.

The arrival of COVID-19 forced through rapid change in the delivery of healthcare in the UK. The spread of the COVID-19 virus was rapid and it was widely reported that patients with complex health had higher rates of mortality. Patients defined as being 'extremely vulnerable' on health grounds were advised to shield to avoid catching COVID-19.[229] Hospitals around the UK were preparing their response to COVID-19, which included the cancellation of elective surgeries, to release capacity for critical care.[230] NHSx (a collaboration between the UK Department of Health and Social Care, NHS England and NHS Improvement), provided guidance for healthcare professionals to facilitate the use of digital during the pandemic.[30] A contract was awarded to the provider *Attend Anywhere* in March 2020 to provide video consultations in response to COVID-19[32]. VC was rapidly implemented across the NHS. I submitted a paper on the 3rd April 2020 that described the rapid implementation of VC at RNOH. The paper was published on the 21st May 2020[31] (in full in Appendix A on page 279). Like other NHS organisations, in-person care was rapidly converted to VC (telephone and video calls) to allow social distancing to remain in place whilst services attempted to meet the needs of patients who required ongoing care.

Although the origins of this PhD pre-date the pandemic, there is no doubt that COVID-19 made an indelible mark on it and shaped its direction. Phase 1[98] of the research was a systematic review of empirical research papers published before 2020. Phase 2[99] and 3[100] were investigations into patient preferences of VC, conducted prior to the COVID-19 lockdown. The context of the research subsequently changed from an investigation into an experimental mode of practice to an evaluation of the experience of accelerated VC implementation as the only available option for outpatient appointments.

9.1 Philosophical approaches

This research is underpinned by three separate theoretical perspectives (NPT[50], BOT[51] and Preference Theory[5]) and used three distinct methods (qualitative systematic review, a discrete choice experiment (DCE) and qualitative interview studies) across different contexts (prior to and during the COVID-19 pandemic). This research used abductive analysis to identify key insights across the range of theories, methods and contexts to inform the development of a theory of patient preferences for VC. The thesis is therefore situated in a Pragmatist paradigm is based on the proposition that researchers should use the philosophical and / or methodological approach that is best suited to the problem under investigation.[231] This position has its origin in Charles S Peirce's two articles: 'The fixation of belief'[93] and 'How to Make Our Ideas Clear.'[94] These are considered to be the foundation of pragmatism. Peirce argued that belief is formed through experiences and that every act of meaning-making requires an interpretant. Abduction is an epistemological position firmly rooted in the paradigm of pragmatism and was inspired by the work of Peirce.[95] Regardless of the methods chosen to fulfil a research objective, abduction in research seeks to identify the 'best' inference from these data amongst potential alternatives.

9.2 The use of theory

The theories used within this thesis provided explanations of the mental mechanisms (preferences) and social mechanisms (implementation and experience) that informed patient responses to VC.

i. The use of Preference Theory

A preference can be defined as a 'total subjective comparative evaluation.'[5] Put simply, a preference is the cognitive process of comparing the alternatives to determine the best option, considering all the information to hand. A preference is 'total' because it considers a range of information; it is 'subjective' because an individual cognitively processes the information to hand; it is 'comparative' because an individual will compare different alternatives; and a preference is an 'evaluation' because it asseses the value of the alternatives. It has been suggested that an individual will make a reasoned choice and choose the option that will bring them the most benefit.[232] In preference theory, agents are individuals who make calculations about benefits. In the context of this research, preference theory explains that individuals will prefer the alternative that brings them the most benefit.

Within this PhD thesis, preference theory[5] underpinned each phase of the research. During each phase, I used the underpinning definition to frame the investigation to attempt to understand patient preferences: *Total* (what is all the information patients require to decide their preferences) *Subjective* (how important is this information) *Comparative* (how do these differ across alternatives) *Evaluation* (what do patients value). Whilst this approach was helpful to frame and shape each phase of the research (phase 1 and phase 4 used NPT to think about patient work, phase 2 used BOT to think about experiences, phase 3a and 3b used a DCE to understand factors that influenced stated preference decisions), the available data was specific to the context of tertiary care. Whilst it is possible to speculate about patient preferences for VC in other settings (such as primary or secondary care), the data collection recruitment methods only allowed for the perspectives of patients and clinicians from a specialist hospital. Furthermore, as demonstrated during phase 3b and phase 4, the changing situation of COVID-19 impacted on patient preferences. Although the use of preference theory was essential to the research, as a theory on its own it does not explain what the different types of information patients require to form a preference. Its combination with other theories was essential to provide the insights about preferences that led to the design of a model of care.

ii. The use of Normalisation Process Theory

Normalisation Process Theory (NPT) is a sociological theory of implementation. NPT explains implementation as agents ‘working’ towards implementation. An implementation process is defined as ‘the translation of strategic intentions into routine practice’[50] through a set of four core mechanisms; coherence (investing meaning into VC), cognitive participation (investing commitment into VC), collective action (investing effort into VC) and reflexive monitoring (investing comprehension into VC). These mechanisms are the work individuals and groups invest during the implementation of VC. In the context of this research, NPT explains that individuals will need to do the ‘work’ of the alternative they choose to implement.

NPT was used in two ways during this research. In phase 1, the use of NPT was loose. I did not follow the theory with fidelity, instead using the inspiration from the theory to outline patient ‘work’ from VC. The qualitative systematic review was challenging because the raw data from studies was not available to me, but I was able to review enough papers and ask ‘*how does this change the work of being a patient?*’ and ‘*how does this change in work influence preferences?*’ In phase 4, I employed the use of an earlier iteration of the NPT coding manual.[86] I followed the coding manual with fidelity to help make sense of the work of implementation of VC for patients, clinicians and managers who had experienced the accelerated implementation of VC due to COVID-19. The use of NPT in a different way to phase 1 provided new and important insights. This demonstrates the flexibility of application of NPT as a theory.

Although the purpose of Phase 4 was not to abductively extend NPT, it is important to note that all data within phase 4 was coded against the NPT coding framework. This may be because the NPT coding manual is an all encompassing framework for implementation (that has been developed and refined over several phases), or it may be because I misinterpreted data as I coded it. Comprehensive coding of data using NPT coding frameworks has been reported in the literature[85] and my anecdotal observation of the data mapping onto the coding manual in Phase 4 is not unique.

Within section 1.6.1.4 I discussed the potential use of the Consolidated Framework for Implementation Research (CFIR).[66] Within that section I outlined that I disregareded CFIR because there was not a ready made intervention to be deployed within healthcare, rather this PhD looked to design a model of care underpinned by patient preferences. Looking back on research during COVID-19, it might have been possible to use CFIR during the accelerated implementation of VC at the hospital. However, the use of NPT really focussed my attention towards patient 'work' which I emphasised to the implementation team during the roll out of VC. As a result, the deployment of VC took into account that not everyone could use VC or have access to the material or informational resources required. Furthermore, the link between NPT,[50] BOT[51] leads to the natural position of MDM (designing healthcare that reduces unnecessary patient workload). Using an alternative approach (such as CFIR) would have changed the perspective and led to different results. Whilst I do not think the resulting use of CFIR would have made the findings of this research any less useful, I acknowledge they would have been different. That being said, I believe the use of NPT worked exceptionally well with both preference theory and BOT and I believe the resulting theory developed from this PhD thesis benefitted from the central role of NPT as an underpinning theory.

iii. The use of Burden of Treatment Theory

Burden of Treatment Theory (BoT) is a sociological theory of experiences.[51] BoT explains the relationship between the demands that participating in healthcare places on patients and caregivers and the affective, cognitive, relational and material resources (capacity) they can bring to bear on this workload. A workload that exceeds capacity has been demonstrated to be a driver of burden of treatment.[87,91,140] BoT is used to explain how the relationship between patient demands and capacity shapes their experiences. Within this thesis, BoT complemented NPT and was used to understand how changes in the work and demands of VC influence preferences in a healthcare setting.

These three theories have distinct ontological underpinnings. There is a significant difference between a patient being seen as someone who performs a calculation to determine the best outcome, being seen as someone who does the work required of implementation and being seen as someone whose experience is shaped by the relationship between capacity and demand. These three separate theories have been brought together in an epistemologically pragmatic way to shape the overall research. The use of abduction allowed integration of different kinds of insights, to find common ground in contending ontological views of the world.

The use of VC in clinical practice is shaped by: the work people do to implement VC in practice,[49,75,233] if the use of VC brings additional benefits (such as to expedite care[20,80]) if it reduces the burden on care (by overcoming mobility or mental health problems,[106] if it saves time / money[234]) and if patients believe the advantages outweigh the disadvantages.[235] These three aforementioned theories are important; they bring differing perspectives to the complex problem of implementation. BoT brings the perspective of patient experience; NPT brings the mechanistic model of implementation and preference theory provides a way to think about how individuals understand value. A pragmatic approach, using abduction as an epistemological and methodological approach enabled the identification of key insights to build a theory. Taken together, these three theories bring more than the sum of their individual parts to develop a theory of patient preferences for VC.

9.3 The use of different methods

i. Qualitative evidence synthesis

A qualitative evidence synthesis was conducted in Phase 1.[98] This synthesis provided a way in to understand the literature about VC in healthcare. The synthesis was underpinned by NPT and key insights were gained about the work patients needed to do to engage with VC. A taxonomy of tasks was developed; these were thematically organised into a framework of the different tasks required to implement VC. This research provided a way to think through the work of being a patient, to enable individuals to consider which patients might not be suited to VC due to the work required. It provided the opportunity to think about the value of VC in the context of patient work and patient experience.

ii. Qualitative methods

The use of qualitative interviews allowed an in-depth investigation into the experiences of participants. Insights from Phase 1[98] were used to design the interview schedule in Phase 2.[99] Identification of the content of the interviews was undertaken and data were labelled in the form of QSR NVIVO ‘nodes’. New insights were gained as the previously identified data was temporarily set aside. This allowed for the identification and characterisation of data to further build on the framework of tasks outlined in Phase 1 on page 33. Characterisation of data sought a range of insights to support model development. The model from Phase 2 was cumulatively extended through Phase 3[100,191] and 4 as new insights were identified.

iii. Discrete Choice Experiment

Important insights that were amenable for testing via a Discrete Choice Experiment (DCE) were carried forward to Phase 3[100] for testing. The DCE was a deductive statistical experiment to identify the direction of preference (i.e. for, or against VC) and the strength of preference (the degree of statistical significance and odds ratio). The design of the DCE was underpinned by the work from Phase 1 and Phase 2 and it considered the viewpoints of the Patient and Public Involvement Group and department managers in the design stages. A pragmatic decision was made to only assess the insights amenable to manipulation in practice. Key insights were retained for the model when they achieved statistical significance.

Within this research, the use of mixed methods research allowed for the identification and characterisation of different types of data. The quantitative DCE provided *an objective threshold for statistical significance about* the factors that influenced preferences for and against VC. The qualitative data provided a broad insight into a range of viewpoints and perspectives of patients. The three different methodologies were inspired by three different types of research question, all commanding different methodological approaches to execute the study objectives. A pragmatic approach and the use of abduction allowed the triangulation of mixed methods research to develop a theory of patient preferences for VC.

9.4 Different contexts

This research was conducted across two distinct contexts: before the start of the COVID-19 pandemic and during the pandemic. All nine reviewed papers within my qualitative evidence synthesis were published before the pandemic. Seven of the papers were embedded qualitative studies;[20,27,107,111,113,114,236] one paper was a standalone grant funded project[49] and one paper was an unfunded, standalone research investigation.[112]

The qualitative interviews conducted during Phase 2 investigated a hypothetical mode of practice.[99] Although some participants had experience with the technology required to undertake a VC, none of the participants in the study had experience of VC for healthcare appointments. Participant responses were speculative as they had no prior experience of VC in practice. The DCE in Phase 3 was also a speculative investigation of stated preference, conducted prior to the pandemic.[100]

In March 2020, during the pandemic, the rapid implementation of VC due to COVID-19[31] represented a dramatic shift in the context for VC. During this time, patients were not able to choose their preferred treatment format, instead they were forced to have a phone call or a video call to facilitate social distancing. I added an additional study (Phase 3b), an investigation into the impact of COVID-19 on preference,[191] that focused on the role of COVID-19 on preference formation. Participants were sampled from the DCE in Phase 3; eight participants who strongly preferred an in-person and five who preferred VC were recruited. All eight participants who were strongly in favour of in-person care stated they would opt for a VC during the pandemic. Furthermore, some of those patients had since undertaken a VC and stated their preferences had changed through use. This demonstrated the impact of context on patient preferences.

Phase 4 provided the opportunity to investigate the experiences of patients who had experienced the use of VC following the accelerated implementation. For these participants, the investigation into their experience of implementation was no longer hypothetical but based on their experience of use in practice. These participants were no longer speculating about the potential of VC but were revealing their lived experience of practice. An integrative analysis identified new data in relation to previously known knowledge about patient preferences for VC. As a result, new insights about VC implementation were obtained that supplemented prior insights.

The combination of these different contexts, before and during the COVID-19 pandemic, poses an epistemological challenge. Some of the papers included in the qualitative evidence synthesis were published over 15 years ago[113,236] as qualitative investigations embedded in larger studies. Only one paper enrolled patients who had not participated in VC.[49] The other eight papers reported the published findings of research projects, where the option of VC was an addition to routine care for those who chose to enter into each respective study. Participants in these eight studies may have been motivated to enrol through the opportunity to seek VC. The papers included in the review were undertaken in a different context to the empirical Phases of this research. To overcome this issue, a framework was developed through the lens of patient work. This led to context-independent explanations about the influence of different tasks on patient preference. These abductive insights are transferrable across contexts.

The qualitative investigation in Phase 2[99] considered how patient experience influences the calculation of patient preferences for VC as a hypothetical mode of practice. The research in Phase 4 considered how the lived experience of accelerated VC in practice, due to COVID-19, influences the calculation of preferences for VC. An abductive approach to these qualitative studies enabled the identification and characterisation of insights through taxonomy building. During the analysis, I dealt with individual codes that described the content of data through a process of defamiliarisation. The characterisation of these codes led to the development of context-independent theoretical insights that are applicable across a range of settings. A pragmatic epistemological approach, and the use of abduction, enabled the combination of different theories, methods and contexts to develop a more robust theory of patient preferences than it would have otherwise been through any singular approach.

9.5 Development of a theory of patient preferences

9.5.1 Why we need a theory

The research literature on VC describes high levels of satisfaction with its use[215,237-239] and VC has been reported to be as effective as usual care.[214,215,240] However, this is not the full picture, as many research papers about VC had strict recruitment criteria. Participants were not eligible for VC if they needed a physical examination,[241] investigations[241] or did not have access to the required technology[102] or high speed internet.[102,214] Within some studies, participants were unable to enrol if they could not communicate in English or if they had problems that needed urgent review.[102] Consequently, participants in these studies may not represent a routine population of patients; physical examination may be required in 80% of musculoskeletal examinations[242] which would have deemed participants to be unsuitable for these studies. Furthermore, investigations such as plain x-rays are routinely used to mitigate risk[243] and determine the progression of disease such as osteoarthritis.[242]

In addition, it is possible that recruitment to research studies on VC may result in the inclusion participants who are more likely to want virtual care than the normal population. My previous research conducted prior to the pandemic showed that half of patients prefer in-person care.[49] Furthermore, the stated preference DCE reported in Chapter 5 on page 103 found only 26% of patients preferred VC.[100] Participants in previously conducted studies of VC prior to the pandemic had to be willing to consent to join the studies[102,241] and if a potential participant prefers F2F care they may decide not to enrol. These research findings may not, therefore, be applicable to practice.

NHS Policy places great faith in the use of digital technology. For instance, the NHS Five Year Forward View[13] described technology as ‘a great leveller’. The policy set out a plan to accredit health apps for patients to ‘organise and manage their own healthcare’, whilst staff were trained to support ‘those who are unwilling or unable to use new technologies.’ This Policy set a clear direction for the NHS and the subsequent Long Term Plan[4] placed the roll-out of digital care as a priority for healthcare for the next ten years.

Research studies into digital care tend to report positive findings of VC. These standalone research programmes are often grant funded, protocolised and properly resourced. There is historical prioritisation of research funds to investigate the use of digital tools in healthcare,[244] which may in part be due to the drivers from healthcare policy. Fully funded programmes of research may have the resources to ensure successful completion, whereas under-resourced initiatives have been shown to be a barrier for implementation.[245] In reality, the process of embedding VC in routine practice has been shown to have complex challenges,[108] which appear to be overlooked in primary studies of VC effectiveness and satisfaction.

As a clinician, at a tertiary orthopaedic centre, I have long been interested in the potential for virtual consultations to support patients to access their care from a distance. Anecdotally, I observed many encounters where the use of VC would be helpful, but also where it was not appropriate. We investigated the acceptability of VC in the literature[48] and in a qualitative study of patient preference and acceptability of VC follow up consultations for patients with shoulder instability[49] prior to the pandemic. In this study, half of patients preferred a VC, although participants stated this was not fixed and they would prefer an in-person consultation if they felt they needed something physically looked at. Some of the patients who opted for an in-person appointment were able to identify occasions where they would be happy with a VC. We found that the acceptability of VC was dependent on the situation at the time. It was unclear what the factors were that led to VC being acceptable. I felt that further research was required to understand the dynamics of patient preference and this inspired me to pursue a PhD in the topic.

It is necessary to develop a theory of patient preference because there is no published literature that explains the factors that influence preferences for VC. I believe that a thorough understanding of the factors that influence patient preference for VC is necessary for the effective design of patient centered care pathways that use VC. A pathway that considers how patients calculate benefit and make choices (through the lens of preference theory[5]), how patients implement different consultation formats, (through the lens of Normalisation Process Theory[50]) and how interactions between capacity and demands shape experiences (through the lens of burden of treatment theory[51]) would be of use to the NHS. It is anticipated that a patient centred pathway that uses VC would yield benefit to patients and enhance the patient experience of care.

This theory of patient preference for VC fills an important gap in the literature. It explains how patients form their preferences and provides healthcare policy makers, managers and clinicians with clear statements about how to consider preferences in practice. The constructs of the theory are underpinned by empirical data; there is no speculation about the explanatory mechanisms outlined in the theory. I have demonstrated how the theory can be empirically applied in service design to create treatment pathways that are likely to be preferable to patients and therefore yield more utility and beneficial outcomes.

9.5.2 Development of the theory

The research I undertook during my MRes in 2014 into the acceptability of VC[49] highlighted the need to understand the dynamics of patient preference. Within this study of acceptability,[49] I gave participants the choice between an in-person follow-up or a VC. I did not want to exclude potential participants who were not interested in VC so I ensured we recruited patients undergoing in-person treatment as well. I interviewed the participants to understand the underlying reasons behind their choice. I was interested in determining why (or why not) patients prefer VC. Participants told me that although they made a decision at this particular point in time, they might choose a different modality in the future. Patient preferences were not fixed and were dependent on the situation at the time. This inspired the investigation for my PhD, which investigated the dynamics of patient preferences for virtual consultations.

My earlier research provided valuable lessons in the importance of pragmatism; rather than searching for one particular perspective, I sought to identify a range of perspectives through maximum variation sampling in Phase 2 to including participants with a range of perspectives and providing participants with a specific question around their preference for Phase 3. The mixed methods nature of the research was chosen to provide a wide range of data and abduction was chosen to triangulate insights from the different Phases of work. As outlined in the introduction chapter and above, I arrived with my own views about the subject matter as a clinician and a researcher in the area. Although these views shaped my role as an interpretant, the development of the model is underpinned by the data collected across all five research papers included within the thesis.

The literature review completed during Phase 1[98] identified nine qualitative papers that met the conclusion criteria. The results, discussion and conclusion sections of these papers were interrogated via a directed content analysis to understand the tasks required of patients to undertake a VC. NPT guided theorisation of these data to develop a taxonomy of tasks to assist in understanding VC implementation. A framework of tasks was developed to aid explanation of how the work of being a patient influences preference. This was modelled to visually demonstrate how patient work influences preferences; we hypothesised that the work of being a patient influences preference and that preferences (and patient choice) influences the work. The paper offered considerations for clinicians and policy makers to think about ways to support patients to do the work. This was important because if the work is too burdensome, patients may find in-person care more beneficial.

The framework from Phase 1 informed the development of the semi-structured interview guide for the Phase 2 work.[99] In keeping with the pragmatic approach to the research, I sought to include patients with a range of views of VC. Patients who were not interested in VC consultations in practice were included to obtain their perspectives. A maximum variation sample was recruited and the patients were sampled on a set criteria of variation (age and gender for patients and occupation for clinicians). This included 22 patients and 22 healthcare professionals. The study aimed to recruit at least 10 male and 10 female patients (10<50 years and 10>50 years) and 20 healthcare professionals (occupational therapists and physiotherapists). The model from Phase 1 was abductively extended in Phase 2. To extend the model, I set aside data relating to the Phase 1 results and analysed data from the interviews that could be characterised as new insights. Data from Phase 1 was then included in the second iteration of analysis. The model was extended to include three additional factors identified from the interviews (situation, expectations and capacity) and the Phase 1 model was renamed 'demands' to include the competing life demands that interfere with healthcare and care demands in addition to the work of operationalising VC.

Data relating to the design of the Phase 3 DCE[100] were iteratively extended with each interview. At the conclusion of the Phase 2 interviews, the DCE instrument was finalised with input from the PPI group and NHS managers at the research site. It was important for this thesis to set out a plan for clinical action and as such, factors that were amenable to manipulation in practice were included within the final instrument. Three DCE pilots were undertaken with patients to refine the questionnaire and ensure comprehension. This was an important step as it was necessary to include as wide a range of participants as possible to enhance the applicability of results.

The deductive nature of the DCE differed to the prior Phases; insights were identified based on their statistical significance and the size of the odds-ratio. Statistically significant factors were included within the model. A binary logistic regression was undertaken and a statistical model was developed to predict the preferences of two distinct patient scenarios to illustrate how the factors may combine or compete to influence preference. The application of statistics provided new insights into the strength of preference. A model was developed from the study, which extended the model from Phase 1 and 2; the model included patients access to resources (capacity) which included socioeconomic (cost, education level) and material resources (access to equipment and software); context for the consultation (situation) which included pathway factors and clinical status; and requirements of the consultation (demands) which included the objectives of the consultation and interaction factors.

A subsequent interview study[191] investigated the results of the DCE. The purpose of this study was to gain insights behind the bottom-line results of the DCE. Qualitative data provided context to why the factors identified in the choice experiment were important. Patients were recruited from the DCE and I sampled patients with strong preferences for and against VC. This, again, was a pragmatic decision that was taken to ensure a range of perspectives. In addition, we asked participants about how COVID-19 shaped patient preferences.

The Phase 4 study investigated patient, clinicians and managers experiences of the accelerated implementation of VC due to COVID-19. Participants were included if they had experience of VC as a patient or clinician in a clinical consultation and if they were non-clinical staff who were involved in the management of VC in practice. The research was underpinned by NPT and a directed content analysis using an NPT coding manual[86] was undertaken to evaluate implementation in practice; regardless of whether or not a patient preferred VC in practice. COVID-19 meant that patients were not provided a choice. This study explained patient preferences through the accumulation of prior phases of the thesis as VC changed from an experimental clinic to a compulsory form of service delivery during the COVID-19 pandemic. The study presented a cumulatively developed theory that explains preference formation. This research provided the opportunity to understand the consequences of being forced into a VC and the impact of not being able to undertake their preferred option due to social distancing guidelines and healthcare policy. This research, therefore, also provided the opportunity to understand how patient preferences are orientated within the healthcare system.

The research from the CONNECT Project led to the cumulative development of a theory of preference formation that explains patient preferences. The use of abduction allowed for the interrogation of new insights from the primary data, to iteratively develop models from each phase. Each iteration of the CONNECT Project contributed unique insights. The final phase of the research performed an integrative analysis of new data in relation to previous knowledge known about patient preferences for VC from the earlier phases. A model of care, underpinned by the theory, is proposed in this chapter.

9.5.3 Constructs of the theory

The conceptualisation of the findings from Phase 4 is presented as a series of mechanisms. I previously defined my interpretation of a mechanism as ‘a process that ‘brings about or prevents change in a concrete system’[193]. A social mechanism is a ‘constellation of activities and entities that are linked to one another in such a way that they regularly bring about a type of outcome.’[194] My position is that patient preferences are the *output* of a total subjective comparative evaluation. The context for the consultation (normative expectations, relational expectations, congruence and potential), the available alternatives and the implementation process (coherence, cognitive participation, collective action and reflexive monitoring) all *input* into the total subjective comparative evaluation. These inputs have been identified as the key entities that are linked to one another to form the construction of patient preferences (see Figure 14 on page 203).

9.5.4 Context for the consultation

Each individual patient arrives to a preference calculation that is situated within their own context; the patient context presents a unique potential to incorporate either a VC or a F2F for a clinical appointment. For some, the use of a VC will be burdensome; for others, the introduction of VC will be beneficial. Patients will need to have access to specific resources (the required hardware, software and skills to use these[110]) to have a VC. Patients needed to be prepared to accept the change in roles and responsibilities required of them through VC use. The patient's context is formed through the interactions between their potential capacity (the resources they have at their disposal) the congruence of the consultation alternatives (the degree to which the features of the consultation fit in with the circumstances for the consultation) and their intentions to integrate the normative and relational expectations (what they perceive to be the roles and responsibilities and how relationships are shaped) of undertaking a VC. If the patient context leads to one consultation alternative being more beneficial than the other, they will prefer the most beneficial consultation.

9.5.5 Implementation Process

The patient context dictates the demands and the work required of patients to implement the available alternatives. Patients need to make sense and build an understanding of these alternatives. Clinicians' and organisational sense-making shapes patient sense-making. Patients invest commitment and engage in the process of determining which alternative is more beneficial and define what they need to do. Each alternative will require different tasks and patients may need to acquire new skills. Patients need to collect and appraise information about the effects of each consultation alternative. These mechanisms are underpinned by the patient context and are summarised below. The implementation process is the input to the total subjective comparative evaluation of the alternatives.

9.5.5.1 Coherence

Coherence is the work of sense-making into the alternative consultation options. Patients access to material and cognitive resources shape their ability to make sense of the consultation. They determine which of the alternatives can be accommodated within their context and understand the way the alternatives change the consultation rules, resources and relationship with their clinician. Preferences are shaped by sense-making:

- *In a total subjective comparative evaluation, patients do sense-making work to determine which of the alternative consultation options is most beneficial.*

9.5.5.2 Cognitive participation

Cognitive participation is the work of investing commitment into the alternative consultation options. Patients access to material and cognitive resources shape their willingness to implement the alternatives. Patients are more willing to accommodate the alternative that can be accommodated within their context. Changes to the consultation rules, resources and relationship with their clinician shape their willingness to implement the alternatives. Preferences are shaped by commitment:

- *In a total subjective comparative evaluation, patients are more willing to operationalise the consultation choice that they believe is most beneficial.*

9.5.5.3 Collective Action

Collective action is the investment of investing effort into the alternative consultation options. Patients access to material and cognitive resources shape their ability to do the work of the alternatives. Their ability to accommodate the consultation within their context shapes their ability to do the work required. Patients expectations about the consultation rules, resources and relationship with their clinician shape their ability to do the work of the alternatives. Preferences are shaped by their ability to invest effort:

- *In a total subjective comparative evaluation, patients work to operationalise the consultation choice that they believe is most beneficial*

9.5.5.4 Reflexive Monitoring

Reflexive monitoring is the work of appraising the alternative consultation options. Patients access to material and cognitive resources shape their ability to appraise information about the alternatives. Their ability to accommodate the consultation within their context shapes the way they appraise information about their experiences. Patients’ expectations about the consultation rules, resources and relationship with their clinician shape the way they appraise the alternatives. Preferences are shaped by their ability to appraise their experiences:

- *In a total subjective comparative evaluation, patients appraise their experience of the alternative consultation options to determine the alternative was most beneficial and carry that appraisal forward to their next consultation choice.*

9.5.6 Preference formation

The implementation process is the input into the total subjective comparative evaluation undertaken by the patient. The patient considers all the available information and cognitively assigns the alternative which brings them the most benefit. The patient will prefer the option that yields them with the most utility.

9.6 Application of the theory

The theory outlined in section 9.5 is helpful because it provides the basis to think through the things that are important to patients. An understanding of these things is useful because it enables us to think about behaviour and provide the potential to predict what a patient will prefer.

During this research, I encountered many situations where patients found the travel to access specialist care extremely burdensome. Prior to the COVID-19 pandemic, the option of a video call was not available. A phone call was available but due to the commissioning constraints at the time, this attracted less funding for the hospital. Services were financially disincentivised to use phone consultations when the alternative (in-person consultations) yielded more funding. Furthermore, patients needed to be visualised and a phone call could not offer this. Prior to the COVID-19 pandemic, the option of a VC was not available and although a patient may have preferred not to travel for an in-person appointment, there were no available alternatives.

The pandemic led to restructuring of normative and relational expectations of care. The emergency nature of care led to a shift in the perceptions of how healthcare should be judged. During the COVID-19 pandemic, the hospital reduced in-person consultations and made VC the preferred option.[31] Whilst many patients acknowledged, within this study, that ordinarily they would have preferred in-person care, they were satisfied and grateful for the opportunity of VC as the only option for rehabilitation. A legacy of the COVID-19 pandemic is the option for multiple alternatives to access care.

Table 32 on page 224 provides a summary decision algorithm for patient preferences. Based on the constructs of the theory, we can start to think about what a patient will prefer. The patient context (normative expectations, relational expectations, congruence and potential) and mechanisms of the implementation process (coherence, cognitive participation, collective action and reflexive monitoring) form the input for the total subjective comparative evaluation. Patient preferences for the alternatives are the output of the total subjective comparative evaluation. Table 32 provides a decision algorithm to help us think about what a patient will prefer.

Table 32 Decision Algorithm for VC

Factor	**Input**	**Prediction of output (preference)**
Normative Expectations	The individual expects the rules and resources of alternative ‘A’ are more beneficial than for alternative ‘B’.	Alternative ‘A’.
	The individual expects the rules and resources of alternative ‘A’ are less beneficial than for alternative ‘B’.	Alternative ‘B’.
Relational Expectations	Individual expectations about their relationship with others in alternative ‘A’ is more beneficial than for alternative ‘B’.	Alternative ‘A’.
	Individual expectations about their relationship with others in alternative ‘A’ is less beneficial than for alternative ‘B’.	Alternative ‘B’.
Congruence	The features of alternative ‘A’ are more congruent with the present circumstances than for alternative ‘B’.	Alternative ‘A’.
	The features of alternative ‘A’ are less congruent with the present circumstances than for alternative ‘B’.	Alternative ‘B’.
Potential	Individual access to material and cognitive resources for option ‘A’ are more beneficial than for option ‘B’.	Alternative ‘A’.
	Individual access to material and cognitive resources for option ‘A’ are less beneficial than for option ‘B’.	Alternative ‘B’.
Coherence	Individuals understand option ‘A’ as being more beneficial than option ‘B’.	Alternative ‘A’.
	Individuals understand option ‘A’ as being less beneficial than option ‘B’.	Alternative ‘B’.
Cognitive Participation	Individuals are more committed to using option ‘A’ than option ‘B’.	Alternative ‘A’.
	Individuals are less committed to using option ‘A’ than option ‘B’.	Alternative ‘B’.
Collective Action	Individuals find working towards option ‘A’ more beneficial than option ‘B’.	Alternative ‘A’.

	Individuals find working towards option ‘A’ less beneficial than option ‘B’.	Alternative ‘B’.
Reflexive Monitoring	Individuals appraise option ‘A’ as being more beneficial than option ‘B’.	Alternative ‘A’.
	Individuals appraise option ‘A’ as being less beneficial than option ‘B’.	Alternative ‘B’.

Now there are multiple alternatives for orthopaedic rehabilitation appointments are available, it is important to start to think about how patients decide their preference, and how we can support patients to decide these in practice.

9.6.1 Application of the theory to practice

The global burden of musculoskeletal disorders is exceptionally high[246] and self-management strategies are a way for patients to manage their problems without directly using up healthcare resources. Self-management strategies are claimed to be ‘essential’ to the management of these musculoskeletal disorders,[247]Hutting et al[247] argue that supporting self-management will contribute towards long-term management of these conditions through empowering patients by providing them with the skills and knowledge to actively manage their condition.

In the context of burden of treatment theory,[51] this approach adds to the demands on patients, without necessarily considering their capacity to meet these demands. Furthermore, any burdens may be exacerbated by social inequalities.[248] A ‘good’ self-manager has been conceptualised as an individual who takes responsibility for their health and is active in using information to make informed decisions regarding their health.[123] This focus on greater individual responsibility is underpinned by neoliberalist philosophy[249] and coincides with the emphasis on self-management outlined in NHS policy.[13]

Minimally Disruptive Medicine (MDM) is an approach whereby healthcare seeks to reduce treatment burden on patients.[52] A minimally disruptive approach to healthcare recognises the consequences of long-term condition management and how this can lead to treatment burden. A minimally disruptive approach is patient-centred and asks the question: *what is the situation that demands medicine and, what is the medicine that the situation demands?*[250] In the context of this thesis, a minimally disruptive approach considers the demands set on patients, factors that shape patients experiences and their individual preferences for VC.

Patient preferences are the outcome of a total subjective comparative evaluation.[5] In Phase 4 of this research, the investigation into the experiences of rapid implementation demonstrated that patient preference formation is a cognitive process that considers the patient context and the implementation process of the available alternatives. The investigation also found that patient preferences are shaped by clinician and organisation preferences. Traditionally, healthcare professionals hold power over patients[204] and the implementation of VC may be seen as less preferable by clinicians and organisations. Clinicians and organisations can shape patient's sense-making, commitment, operational work and commitment to operationalise VC in practice. Shared Decision Making (SDM) attempts to overcome the 'arenas of struggle'[209] between high and low powered individuals when different individual preferences are incongruent. In practice, SDM is where clinicians and patients make decisions together using the best available evidence.[251] This theory of patient preferences explains how patient preferences are constructed and therefore offers a way in to understanding what patients value from in-person and VC's.

Within Phase 2 of the research, I developed a series of sensitising questions for patients and clinicians to consider (in Table 11 on page 90) to support the formation of preference. In addition to this, I proposed some infographics within Figure 7, Figure 8, Figure 9 and Figure 10 on pages 94-97. Following on from the later phases of the research, Table 33 on page 227 extends these and offers further sensitising questions for patients and clinicians to discuss during shared decision-making conversations.

The use of these questions, underpinned by the theory, offers a minimally disruptive approach to care as they consider the demands set on patients and the factors that shape their individual preferences for VC.

Table 33 Sensitising Questions to understand patient preferences for VC

Factor	**Topic to discuss**	**Sensitising question for patients to consider**	**Sensitising question for clinicians to consider**
Normative Expectations	Which alternative does the patient and clinician collectively expect the rules and resources to be more beneficial?	Do I think phone, video or in-person care will be best suited to what I need?	Do I think phone, video or in-person care will be best suited to what the patient needs?
Relational Expectations	Which alternative does the patient and clinician collectively expect their relationship with others to be more beneficial?	Do I think phone, video or in-person care will be best suited for me to interact with my clinician?	Do I think phone, video or in-person care will be best suited for me to interact with the patient?
Congruence	Which alternative does the patient and clinician collectively view as being more congruent with the circumstances?	Do I think phone, video or in-person care fits in with my life best?	Do I think phone, video or in-person care fits in with my role as a clinician best?
Potential	Which alternative is best suited to both the patients and clinicians available resources?	Do I have everything I need for phone, video or in-person care?	Do I have everything I need for phone, video or in-person care?

Coherence	Does the patient and clinician collectively understand the alternatives?	Do I understand everything I need to about what a phone, video or in-person consultation is?	Do I understand everything I need to about what a phone, video or in-person consultation is?
Cognitive Participation	Which alternative is the patient and clinician collectively most committed to using?	Do I most want to have a phone, video or in-person appointment?	Do I most want to have a phone, video or in-person appointment?
Collective Action	Which alternative is the patient and clinician collectively working towards using?	What do I need to do to make sure a phone, video or in-person consultation works?	What do I need to do to make sure a phone, video or in-person consultation works?
Reflexive Monitoring	What work does the patient and clinician need to do to collectively appraise the alternatives?	How do I know whether a phone, video or in-person consultation is successful?	How do I know whether a phone, video or in-person consultation is successful?

These above questions form the foundation for a shared decision-making conversation in practice. Each patient and each clinician considers the individual topics and a discussion takes place around these. It is anticipated that a discussion that takes these factors into account, will enable a shared decision to be made that best matches both patients and clinician preferences.

The research highlighted some clinical concerns around the safety and effectiveness of VC. These concerns shaped clinician preferences of VC. Although previously published trials of VC demonstrate high satisfaction[215,237-239] and effectiveness,[214,240] anecdotally, research studies published prior to the pandemic may be seen as outdated as the context of care has shifted dramatically. Furthermore, some clinicians in our study missed deterioration over VC and they lost trust in the reliability of VC to assess patients. As a result, many clinicians felt that the first appointment needed to be in-person to allow a thorough assessment. Clinicians were then happy to have a conversation with patients about the follow up options. It was recognised that sense-making is a cognitive process and patients may benefit from being provided with information ahead of their consultation to give them time to make an informed decision. Examples of potential questions for patients to make sense of the role of VC within their care were published in Phase 2 of this research[99] and further developed and presented in Table 33 on page 227.

One significant finding from the CONNECT Project is that most patients actually prefer in-person care. This was quantified within the DCE in Phase 3 of the research where 74% of patients expressed their stated preference for a F2F consultation. These insights were explored further in Phase 3b where we concluded that although patients preferred VC during COVID-19 and it was acceptable during this time, following on from the pandemic patients are more likely to prefer in-person care. Clinicians in Phase 4 expressed a strong preference for initial appointments to be in-person, particularly after orthopaedic surgery. Although patient preferences were individualised, it was felt that most patients would prefer a first in-person consultation. It was also felt that if a patient preferred a first VC appointment, this would be acceptable. It was also felt that most patients would prefer an in-person final appointment to ensure they are doing the correct things. If a patient preferred a final VC appointment, this would also be acceptable.

A potential pathway that takes this into account has been modelled in Figure 16 on page 234. Although the pathway suggests an initial F2F consultation, any accompanying information communicated with the initial appointment (such as a video, leaflet, information letter) would make it clear that a patient can choose to have a VC should they wish.

9.6.1.1 Information to help patients decide their preferences

The following wording was suggested by the CONNECT Project PPI group at a meeting in June 2022 to accompany any information letters for patients:

You have been given an appointment on _______ date, at ______ time. We have booked you in for an in-person appointment at _______ Department at ______ Hospital. If you would rather have a telephone or video appointment, please contact the department on _______ phone number or ______ email address and we will arrange this.

During your first appointment you may wish to discuss with your clinician whether you would like to have an in-person follow up, or a follow up by telephone or video call. This is up to you. You may wish to consider the following information to help you decide:

- *Do I think phone, video or in-person care will be best suited to what I need?*
- *Do I think phone, video or in-person care will be best suited for me to interact with my clinician?*
- *Do I think phone, video or in-person care fits in with my life best?*
- *Do I have everything I need for phone, video or in-person care?*
- *Do I understand everything I need to about what a phone, video or in-person consultation is?*
- *Do I most want to have a phone, video or in-person appointment?*
- *What do I need to do to make sure a phone, video or in-person consultation works?*
- *How do I know whether a phone, video or in-person consultation is successful?*

You may wish to plan your care with your clinician and discuss how you will have your final appointment as well. If you need to have a physical assessment this may be better in-person, but the decision is yours and your clinician will be happy to discuss this with you.

9.6.2 A model of care

This proposed pathway in Figure 16 on page 234 is an example of the empirical application of the theory in practice. To make sense of the alternatives, patients are provided with resources to help shape their care at the beginning of the pathway by considering their preferences and having awareness of the alternatives available to them. These resources could be provided on paper, via email, or via a video. Resources such as these could be translated into multiple languages and could be tailored to different hospitals settings and contexts.

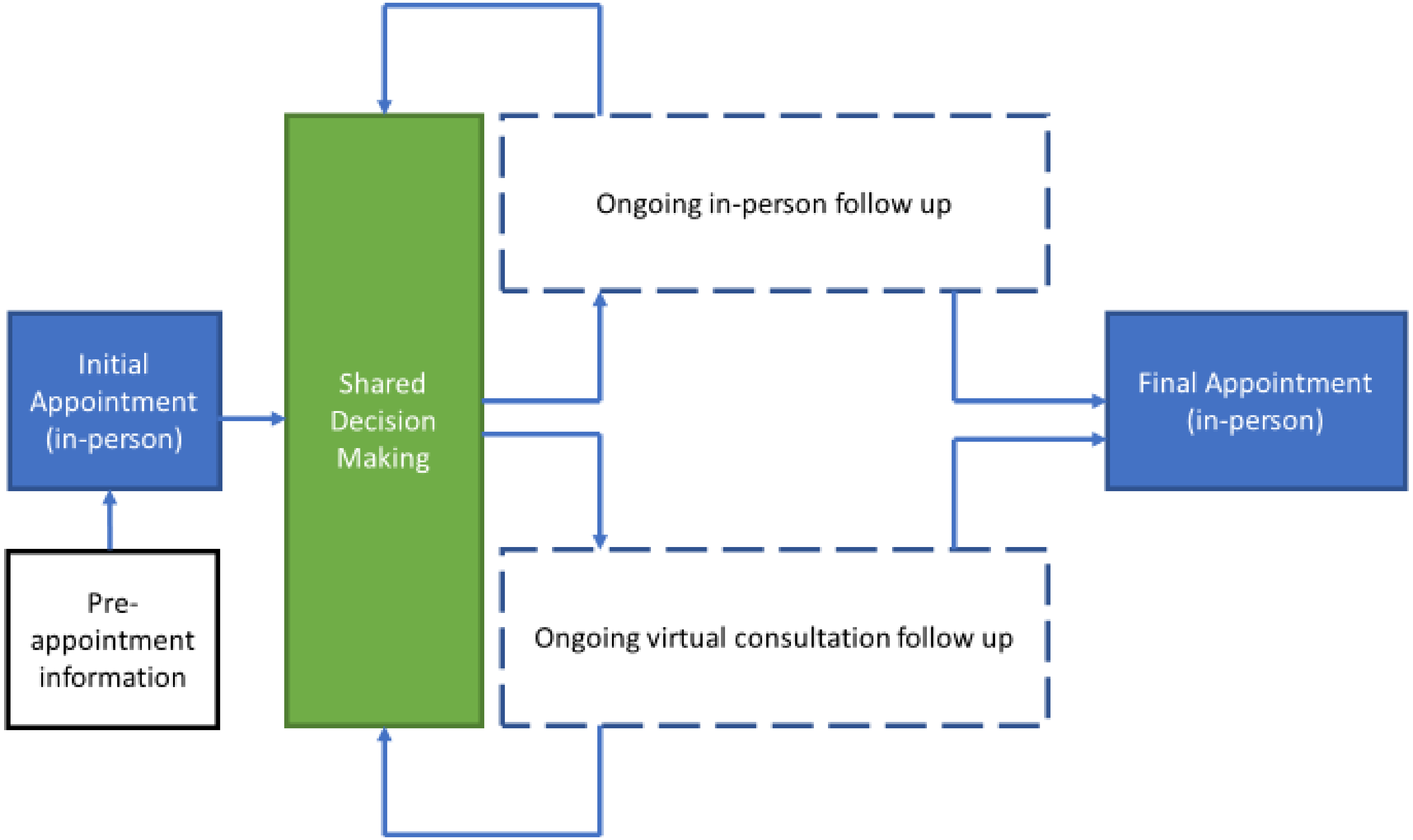

Figure 16 Model of a minimally disruptive patient pathway in practice

9.6.3 Application of the theory to a case study

Within this section, I outline two case studies in the form of clinical vignettes. These case studies both present different people with different backgrounds.

9.6.3.1 Case study 1

Angela is a 48 year old female who is suffering from back pain. She has had the pain for three years and has seen multiple physiotherapists. She has recently fallen into financial troubles which has affected her motivation for rehabilitation. She knows her physiotherapist well and has a good rapport. She feels she needs a ‘kickstart’ conversation to get back on track.

Angela finds sitting for extended periods of time painful. She describes her journey to her hospital appointment as ‘traumatic’ and suffers for pain for several days afterwards. She finds it difficult to recall her rehabilitation programme when she attends the hospital due to the pain. Her work is very busy and she cannot afford to take time off work. She is well set up for a video consultation at home and has all the rehabilitation equipment at home in her home-gym. She experienced VC during the COVID-19 pandemic and found it worked well. She believes she can get what she needs from a VC without having to travel in for an in-person consultation.

Angela received the wording in Section 9.6.1.1 and saw that she had been put down to have an in-person consultation. Although she would be happy with this, she saw that there was an option for VC and felt this suited her needs and life. Angela preferred VC and was given the opportunity to have this by contacting the department.

9.6.3.2 Case study 2

Amit is a 48-year-old male who is suffering from shoulder pain. He feels his shoulder is ‘stuck’ and needs physiotherapist to physically assess his problem. He is unable to do the heavy lifting aspects of his work in a physical job; he has been signed off sick on full pay until he is fit to return to work. He has been reading about shoulder problems online and he is worried it is something serious.

Amit has dyslexia and struggles with the computer. The only device he has available to him is his smartphone which has a crack on the screen. Amit does not have the space at home to be able to do his rehab; his son is having house renovations and the whole family (including three grandchildren) has moved into their 2-bedroom house and he won’t be able to find a quiet space. He has had lots of physiotherapy in the past as he was born with a hip problem and he believes that ‘hands on’ rehabilitation is the best approach. Amit has always found going in for an appointment gives him motivation to get on with his exercises. When Amit tried a VC during the COVID-19 pandemic, he couldn't get the software to work and the call was abandoned.

Angela received the wording in Section 9.6.1.1 and saw that he had been put down to have an in-person consultation. Amit was happy to have an in-person consultation and took no further action.

Both of these vignettes offer a different perspective to the use of VC in practice. A first in-person appointment would provide the opportunity to have an in-depth examination for each patient, in accordance with the norms of professional practice. Amit prefers an in-person consultation and would be happy with this. Angela is happy with a VC.

The pre-appointment information sent to patients prior to the initial consultation would provide the patient with an awareness of the available consultation formats. Patients would receive an in-person consultation by default, but they would have the opportunity to switch to a VC should they wish. The sensitising questions, based on the findings of the research, would support patients to decide what option if best for them, and ultimately help with the formation of their preference. Should the patient wish to opt for a VC rather than an in-person consultation, they would be able to do this, in accordance with the pathway of care demonstrated within Figure 16 on page 234. Following the initial consultation, a shared decision-making conversation, based on the constructs of the theory of patient preference offered within this research, would identify the most appropriate follow up approach for each individual patient. A shared decision-making conversation would happen after each appointment in preparation for the next consultation.

9.6.4 Strengths and Limitations of the theory

The aim of this research was to identify, characterise and explain patent preference for VC in orthopaedic rehabilitation. This research brought together three distinct theories; the use of Normalisation Process Theory,[50] Burden of Treatment Theory[51] and Preference Theory[5] enabled characterisation of empirical data to support the development of a theory of patient preferences for virtual consultations. Although the research intended does develop a comprehensive theory, the five research papers underpinning the development of the theory may not encompass all factors that influence preference. The theoretical constructs were developed through research undertaken at a single site and it may not be transferrable elsewhere. To overcome this, the theoretical constructs are context-independent and could be applied to other settings. The pragmatic approach of the research and the use of abduction enabled the application of different theories[5,50,51] and research methods across different contexts of VC through the cumulative abductive identification of insights through the different phases of the CONNECT Project, before[98-

[100], during [31,96] and after the COVID-19 pandemic. The resulting model is the result of a pragmatic, real-world investigation into the implementation of VC in practice.

I, as the researcher, completed data collection and led the analysis of data and it is possible that a researcher with other perspectives may have identified alternative insights to develop the theory. Furthermore, the use of alternative underpinning theories may have yielded a different outcome. Despite this, the constructs and mechanisms on the theory are clearly defined and well placed to be used in future empirical investigation through different analytical approaches such as framework analysis or used as a programme theory.

Future research could refute the theoretical constructs and mechanisms offered within this thesis. Further investigations across different areas of healthcare could enhance its transferability and usefulness in practice. Whilst this thesis has offered statements that may aid prediction of preferences, further research is needed to understand their relative importance.

9.6.5 What the theory adds

The theory outlined within this thesis fills a gap in the literature; the theory is the first to explain how patients construct their preferences for the use of virtual consultation in an orthopaedic setting. The theory has provided the foundation to understand the factors that influence preference and how patients preferences are orientated in relation to clinician and organisational preferences. The mechanisms of the theory have been clearly defined and a model has visually represented the relationships between the theoretical constructs. Although the theory was developed based on a series of empirical investigations at a single center, the theoretical constructs have been abstracted in a manner that renders them independent of context; this theory can therefore be the point of departure to empirically investigate patient preferences in other contexts.

9.7 Strengths and Limitations of the thesis

Strengths and limitations for each of the empirical studies that make up the thesis have been discussed in previous chapters. The strengths and limitations of Phase 1 can be seen on page 58, Phase 2 on page 99, Phase 3 on page 126, Phase 3b on page 162 and Phase 4 on page 199. Within this section, I offer a further reflection of the strengths and limitations of each of the empirical papers, before I consider the strengths and limitations of the overall thesis.

9.7.1 Critical reflection of the methods: Phase 1

Within Phase 1 of the research, I described limitations of the systematic review (Section 3.5.1 on page 58). The limitations included the fact that the papers were from a range of different countries that all utilised different technologies. By limiting primary studies to qualitative methods only, this potentially meant that additional data that would have been useful for analysis were not included.

Phase 2 of the CONNECT Project extended the model developed from Phase 1; primary interviews generated a considerable amount of data that went beyond the findings of Phase 1. Whilst this was the objective of Phase 2 (to abductively extend the findings of Phase 1), it is clear that a wider pool of data for analysis would have enhanced the credibility of the results from Phase 1. The data for analysis consisted of the results, discussion and conclusion section of the published papers. A secondary analysis of the interview transcripts from all of these primary studies would have led to more data for analysis. Furthermore, analysis of the interviews would have removed the potential of bias as the reanalysis of the published papers was limited to what the researchers deemed to be important data to include.

9.7.2 Critical reflection of the methods: Phase 2

The main limitations from this study, covered within section 4.5.2 on page 99, were the recruitment approach and planned sample size, the single site nature of the research, and the potential for bias due to the fact that I am a treating clinician within the hospital.

As elaborated within the empirical paper in section 4.3 on page 64, patients were initially approached about the research by their treating clinician. As the research demonstrated, there was a range of viewpoints about VC reported by clinicians. If a clinician was strongly in favour of in-person consultations, they may not have mentioned the research to their patients and important viewpoints may have been missed.

Anecdotally, I was approached by clinicians within the department and told that patient X was ‘perfect’ for the research because they were keen to trial VC. I had to explain that the purpose of the study was to understand factors that influence preference, not to bring VC into practice. The way clinicians communicated the research to the patients will have had an impact on how the research was perceived. The only communication I had with clinical colleagues about the study was an email of invitation to participate and to alert their patients. A briefing session with clinicians to over the aims and objectives and how to discuss the research with patients is likely to have been helpful.

During the planning stages of the research, I was based within the inpatient orthopaedic team, whereas the research was being conducted across outpatient services. I believed that this would limit potential biases through knowing the service as I would be within a different team. I was able to achieve the recruitment target ahead of time. This may reflect the fact that I was well known within the hospital as a clinical researcher and clinicians were very willing to support. This agenda to support my research is an important bias to acknowledge. This may not have been the case across other research sites or if other researchers had led the project; their interactions with patients and clinicians will have been different to mine. Furthermore, their interpretation of the data will have been different had they not spent eight years working within the hospital as a clinician like I had at the time. The epistemological position of abduction, where I was the interpretant, was shaped by my prior relationships at the research site and this had an impact on the research findings.

Although I thought I had fully considered the limitation of conducting research within my team, it became clear that my relationship with colleagues across the hospital may have influenced their communication and conduct about the research, which is an important limitation to acknowledge. I did not interview patients that I had a pre-existing relationship with, I did not wear my clinical uniform or introduce myself as a clinician. Despite this, I was familiar with the surroundings and processes and my clinical experience shaped my interpretation of these interview data.

9.7.3 Critical reflection of the methods: Phase 3a

One limitation of the research is the fact that it was cumulatively developed over the previous two phases. The challenge of this is that the focus of this phase was restricted to the factors that I identified as being important to investigate. I outlined the process for deciding the final factors within the empirical paper in section 5.3 (page 107). A pragmatic approach was taken to select the variables that were deemed important by patients, clinicians and managers at RNOH. The final instrument may have been different had it been developed in conjunction with other sites. This pragmatic decision was taken prior to the COVID-19 outbreak and is a limitation.

Although we did plan to recruit patients from multiple sites, COVID-19 meant this was not possible and this was an unfortunate limitation. The DCE was terminated before we reached our recruitment target and although we reported statistically significant findings, this was undertaken with a post-hoc power calculation and these results should be interpreted with caution.

The findings of the DCE are objective and offer a threshold for statistical significance. What is not clear, however, is the underlying reasons behind the significance of these factors. A further qualitative study (reported in Phase 3) was subsequently designed and executed to provide additional context to remove ambiguity.

The DCE was conducted within a healthcare context, at RNOH. One criticism with stated preference techniques is that these may not translate into revealed preferences and actual behaviour. It was not possible to hold patients to their revealed preference and therefore we cannot be certain that the stated preference will enable us to predict choice outcome. Patients who undertook the DCE had already travelled to RNOH and this patient group may represent individuals who were already prepared to travel to RNOH. This may have been reflected in the 76% choices in favour of in-person care. Provision of the DCE at other sites, outside of a healthcare context, may have led to different stated preferences for patients. This DCE was highly contextualised at RNOH and the findings may not be directly applicable elsewhere.

9.7.4 Critical reflection of the methods: Phase 3b

This phase specifically focused on the findings of Phase 3. Other factors not included within the DCE were therefore not considered in the semi-structured interview questions. The qualitative study was conducted after the first COVID19 lockdown and is highly specific to this point in time, as the COVID-19 pandemic wanes, these findings may not be applicable.

The recruitment strategy for this phase was limited by the small pool of patients available from the DCE. Of these, nearly 70% did not respond to the invitation email. This may be due to a general disinterest in VC, which would have contributed towards the findings. It also may be due to the fact that the research was carried out during a global pandemic and members of the public had other priorities. Higher recruitment numbers may have influenced the findings.

The use of a predetermined coding framework focused attention towards the factors that were deemed important a-priori. The focus of the study was on the interpretation of the DCE results and to understand the impact of COVID-19 on patient preferences for VC. A standalone study looking at the impact of COVIS-19 on patient preferences for VC, across a wider pool of patients at multiple sites, may have led to more transferrable results.

9.7.5 Critical reflection of the methods: Phase 4

Limitations of Phase 4 are discussed within the empirical paper in section 8.5.1 on page 199.

Clinical staff were asked to identify patients for the study, it may be that patients who were ‘against’ VC were unwilling to enter the study and their viewpoints missed. In addition, many patients attending RNOH for rehabilitation during the COVID-19 pandemic were only able to undertake phone calls, or were put on ‘SOS’ for a period of months during the height of ‘lockdown’. Since the start of my research, there has been debate about what a ‘VC’ is. I have defined a VC as a Virtual Consultation (phone or video consultation) whereas within the orthopaedic and physiotherapy community people often refer to VC as a ‘Video Call.’ A lack of universal definitions may have impacted recruitment as those patients who undertook a phone call may not have been approached to enter into this study. Anecdotally, 90% of patient interviews were undertaken via video call so this research may represent a skewed demographic of technologically able patients.

As with Phase 2, clinicians in this study were not provided with training on how to recruit, this aspect of recruitment relied on an assumption that clincians were aware of the aims and objectives of the study. Any misinterpretation of the aims and objectives may have influenced findings.

The RNOH’s roll out of VC was reported to be a great success.[96]Views of clinicians and managers may have been influenced by this and responses to interviews may have been biased in favour of VC. Section 8.4.1.3 (on page 177) provides an overview of manager experiences of the accelerated implementation of COVID-19. Although managers were aware of implementation issues, they were largely in favour of increasing the use of VC. Wider recruitment at other centres, particularly those who did not have such a positive experience of VC roll out, may have led to different interpretations.

My role within this research was key. I was able to interview patients, clinicians and managers about their experiences of VC at a time where I was key to the successful delivery of VC. The benefits of this is that I was able to ask key questions and probe participants experiences within the interviews. One of the challenges I found when conducting data analysis was that it was cognitively demanding to process huge amounts of raw interview data. Personally, I found it naturally easier managing these data within NVIVO and Excel. It provided me with the opportunity to think logically about the relationships with constructs. Although I tried to embrace the epistemological approach of abduction, one potential drawback of this approach is that moving into NVIVO at an early stage may have interfered with the theorisation process by inhibiting my ability to embrace my role as a clinician as I developed insights from these data.

The sample size for the study was decided a-priori and a pragmatic decision was made for data to be collected prior to analysis. I completed data collection before I started the analysis process. This may have prevented sensitisation to key insights from the earlier interviews which removed the opportunity for these to be probed during later interviews. A data driven approach may have led to different interpretations and results from the study.

9.7.6 Key limitations of the overall research

One of the main limitations of this research is that it was conducted within a single NHS organisation. The protocol for the research[97] outlined the plan to conduct Phase III across two organisations (a tertiary orthopaedic hospital in London and a secondary care orthopaedic hospital in Oxfordshire) however, the COVID-19 pandemic led to the early termination of the study at the secondary care hospital in Oxfordshire. Whilst I attempted to recruit a varied range of participants within the research (Phase 2 focused on diversity of age and gender; Phase 3b and 4 focused on diversity of perspectives), this research was pragmatic and it was not possible to purposively recruit across a diverse range of ethnicities, disabilities and socioeconomic status. Furthermore, participants presence at a tertiary orthopaedic hospital may represent a level of clinical complexity not seen in non-tertiary settings. Conversely, a patient’s ability to secure a referral to a tertiary orthopaedic hospital may indicate a level of skill to be able to navigate the healthcare system that other patients do not possess. Consequently, the empirical data underpinning these results may not be applicable across other organisations. To overcome this, the theory and models have been reduced to their simplest, most abstract form, to allow transferrability across other settings.

The research was conducted at a specialist centre within the NHS in the UK. The fact that the research was conducted at one single specialist site may have led to several important potential sources of bias:

- Specialist tertiary centres, such as the RNOH, often see patients from all over the country. Patients often have to travel for several hours to get to the RNOH. As such, the patients that were recruited may represent a sample already willing to travel long distances for in-person consultations as this was the status quo. Alternatively, these patients might be significantly burdened by the longer journeys and may be biased in favour of VC.
- It takes a significant amount of skill to navigate the NHS. Patients attending NHS tertiary services may have had to overcome significant challenges to obtain a referral to the tertiary centre. Anecdotally, these patients may have higher levels of social skill and health literacy to be able to navigate the NHS system to end up in tertiary care.
- Patients attending NHS tertiary services have often received healthcare elsewhere prior to obtaining a referral to a specialist centre. Patients with experience of different healthcare settings may have formed expectations about healthcare that may favour in-person or remote consultations. The previous experiences of these patient groups may lead to expectations that differ from those patients accessing primary or secondary care.

- Patients attending tertiary services may have experience of ‘failed’ healthcare at other settings that has led to the specialist referral. These patients may have stronger expectations of in-person care than someone who is new to the system. These patients attending tertiary healthcare may have stronger feelings in favouring in-person care because of these experiences which may have biased the results.
- Patients attending tertiary care may have more complex diagnoses that have not been managed successfully elsewhere. The burden of illness from these more complex diagnoses, or a diagnosis with complex co-morbidities may be significantly more in a tertiary centre. Some patients I have interacted formally within the research and informally in my role as a clinician have described a feeling of desperation to undertake in-person care as this makes them feel seen and heard. Furthermore, some patients undertaking tertiary care have been told that a specialist centre will help them with their problems. These patients arrive to care with a certain desperation to seek reassurance from care providers. This reassurance may not be possible over a VC.
- Where patients have had poor experience of healthcare the idea of a virtual has made some feel ‘fobbed off.’ Patients attending routine primary or secondary care appointments may not present with such viewpoints and these may be reflective of a tertiary care caseload.

As such, a research thesis with multiple research sites across a wider variety of settings (such as primary, secondary and tertiary care) may have led to more transferrable findings across the NHS.

Another potential limitation was that I was employed as a member of staff at the hospital where the research was conducted. To overcome this, the following steps were taken: across all studies patients who were known to me, or had previously been treated by me, were excluded. All interview data went through a set process of identification where each transcript was interrogated, on a line-by-line basis, to identify insights and each insight was assigned a code. Codes were organised into a taxonomy of insights. These codes were then characterised to inform the development of explanatory models. During the data analysis I worked with the codes, rather than the raw interview data. This process of defamiliarisation allowed me to engage with the data without being overtly influenced by the familiar surroundings of my workplace. In addition, I kept a reflexive journal where I recorded and challenged my own biases throughout the development of the thesis, which I have expanded on in the *Reflexivity* section of this thesis (see section 9.9 on page 247).

The studies within the thesis were developed cumulatively, where Phase 1 informed Phase 2 and Phase 2 informed Phase 3. The identification of insights in earlier research influenced the development of subsequent studies. Phase 3 deductively tested the interactions between preference and a vector of variables that were identified in Phase 2. Phase 3b investigated the results of the DCE in Phase 3. Phase 4 was an integrative analysis of new data in the context of previous insights from the prior phases. The use of abduction as the epistemological position and method for the research was helpful here; abduction ensured a focus on variation in these data through the identification of a range of factors to be tested. Abduction in this research, however, was based on my interpretation of the data. This approach has the potential drawback of excluding factors that I personally deemed unimportant. Different individuals may have approached this research with a different outlook that may have identified other factors.

It was important to keep the data meaningful and relevant to enable the design of a minimally disruptive model of care in orthopaedic physiotherapy that is supported by VC. A minimally disruptive medicine[52] approach seeks to minimise the burden on patients. This thesis is underpinned by NPT,[50] BoT[51] and preference theory.[5] The use of these theories were employed to guide theorisation of the data; NPT focuses on the work of implementation and BoT considers the interactions between the work and the patient's capacity to execute the work. Preference theory was used to understand how patients calculate benefit when offered the choice between VC and an in-person consultation. The use of these theories helped to retain a focus on the research. However, one drawback of this approach is that selective interpretation of the data may have led to data being disregarded or conceptually ignored if they did not 'fit' the underpinning theory. The use of other theories may have shaped the abductive interpretation of these data differently and led to different results.

The pragmatic ontological position of the thesis enabled a mixed-methods approach to the research. The abductive approach of the thesis, as it transitioned from an experimental programme of R&D to an evaluation of accelerated implementation, allowed the inclusion of a range of insights across time and context (Phase 1-3 were conducted pre-COVID-19; papers 4-5 were conducted during COVID-19). The underpinning philosophical position of the research allowed me to shift the focus of the thesis in response to the COVID-19 crisis. This generated new insights that facilitated an understanding of the experiences of patients, clinicians and managers. These insights were central to the theory of patient preferences developed within this thesis. Whilst the focus of the thesis (patient preferences for VC) remains the same, the ability to respond to the COVID-19 pandemic provided unplanned insights to further strengthen the model for a minimally disruptive pathway of care beyond the pandemic.

The COVID-19 pandemic led to several changes to my research. The DCE in Phase 3 was terminated early and we di not achieve the recruitment target. Peoples perceptions of VC changed during the pandemic; overnight the technology transformed from a discrete form of service provision for the only way for people to receive care.

My relationships with clinical and managerial colleagues changed; I was seen as an expert in the field and I was contacted by many of them for support with their clinical practice. During the accelerated implementation of VC I was a key member of the implementation team. When I subsequently contacted clinicians and managers to be interviewed in Phase 4, I received an overwhelmingly positive response.

Patients, clinicians and managers relationships with VC changed during my PhD. Prior to the pandemic, the use of VC would have led to a significant financial loss to the RNOH. Furthermore, there were significant information governance concerns about video calls. After the pandemic, VC was fast-tracked to becoming the Trusts key strategic priority for outpatient appointments during the first wave. This was discussed in detail during clinician and manager interviews, there was a positive light shone on the role of VC during the height of the pandemic. Patients who were previously against VC were suddenly in favour of VC as it became the only way to access care. The pandemic significantly impacted on recruitment to my research studies as participants were more willing to share their experiences during the pandemic. Individuals with positive experiences were keen to share these, with the agenda to try and normalise VC within practice. Individuals with negative experiences were keen to share these also, to get their views across to influence local policy. VC became a hot topic; several small scale projects were conducted looking into various aspects of VC across the Trust.

The context for the research changed with COVID-19. There was an urgent need to translate findings from the earlier phases of the CONNECT Project into care. From a PhD student perspective, following a three month pause in my studies as I returned to clinical work, I had pressure to meet the time schedules of the research. Governance significantly relaxed during this time; I was able to recruit participants via email and I could undertake video interviews with participants. All of the participants in Phase 3b and Phase 4 underwent virtual consent via email and all interviews were conducted virtually. This is important because each of these research participants were able to demonstrate a minimum level of technological skill to gain entry into the research. This may be a source of bias as the research may have attracted patients with a specific set of skills; other patient without these skills may have been excluded and the viewpoints of these people with lower technological skill were not reflected within the research. The overall findings and the model of care, therefore, might not be applicable to patients without the required basic computer skills to use VC.

The COVID-19 pandemic provided me with the opportunity to investigate the actual experiences of VC use in clinical practice. This was not something that I anticipated at the start of the research and was a serendipitous outcome of COVID-19. I was able to investigate peoples experiences of VC use before and during COVID-19, which helped shape my own service at RNOH and other services elsewhere through a variety of dissemination strategies (see Appendix S on page 409 and Appendix T on page 413). The pragmatic approach taken throughout the research proved to be extremely useful to enable me to respond during challenging circumstances.

Patient and Public Involvement (PPI) was key to the research. The first PPI meeting for this research was in August 2016, almost 2 years before I started my PhD. The group highlighted important considerations for the research, such as the potential for digital exclusion in the pilot of the minimally disruptive consultation in Phase 4. The PPI group suggested important changes to the qualitative interview schedules and the DCE wording. At our PPI meetings I presented my findings and they suggested helpful ways to communicate the findings to patients and clinicians; the wording of the sensitising questions in paper 2 were developed with the group. As the research shifted from a traditional research PhD, so did the role of the group; they supported the design of the final pathway to be implemented in practice and the associated patient facing materials. The input of the PPI group has been important throughout the research and has strengthened the overall findings of the thesis.

This is a clinical thesis, which at the heart of it plans for action. During each paper, I have tried to make the results as meaningful and as applied as possible to clinical practice. These findings have already been communicated to the musculoskeletal physiotherapy community through presentations at conferences, webinars, podcasts and informal conversations (see Appendix S on page 409 for academic presentations and Appendix T for non-academic presentations on page 413). The simple, abstract, take home messages, the models and the theory are context-independent and likely to be applicable across healthcare.

9.8 Contribution of the thesis

Despite these limitations outlined above, the research has had immediate impact, in that it has already been practically valuable and influenced practice within the NHS at the RNOH. The COVID-19 pandemic required rapid action to convert in-person consultations to VC in March 2020 at RNOH. As a result of my research in this area, I joined the non-face-to-face action group at the RNOH and was able to share the findings of my research with the team. Although, on a personal level, I found it hard to accept that my PhD investigation was going to change, I saw the opportunity that was presenting to shape the implementation of VC in practice. The manuscript[31] and reflections[96] on this work are presented in Appendix A on page 279 and Appendix B on page 299. As a researcher investigating patient preferences for VC, I was conceptually equipped to rapidly implement a real-world service and I was able to provide insight into how patients might respond to VC. Whilst my research was not formally patient engagement, it investigated patients' views and the insights I was able to contribute influenced the direction of VC implementation, as discussed in an Applied Research Collaboration (ARC) South London Webinar.[252] I highlight the contributions the research from this thesis has made to practice below.

In Phase 1, a taxonomy of patient work was developed to illustrate how the use of VC changes the work of being a patient and how this change of work influences preferences (see Figure 4 on page 57). As a result, the RNOH non-F2F action team considered the work of being a patient and a clinician in the roll out of VC.

In Phase 2, the qualitative study investigated different factors that influence patient preferences (see Figure 6 on page 87). Sensitising questions were developed from empirical data to support patients with the identification of preferences (see Table 11 on page 90). As a result, the option of both telephone and video consultations were made available as it was recognised video calls would be challenging for some individuals. Floor walkers (support staff to assist with technical difficulties) monitored the Attend Anywhere waiting room and supported patients and clinicians with technical issues.

In Phase 3, the Discrete Choice Experiment (DCE) investigated patients' stated preferences for VC. Across all choice sets, patients preferred VC in 26% of scenarios. Consequently, as VC was enforced on patients, the RNOH policy on patient non-attendance at appointments was flexibly applied, particularly when patients struggled to access their care when using the technology. It was recognised that most patients prefer in-person care (see Table 15 on page 116). Patient and clinician satisfaction data were collected to understand the experience of VC in practice.

Whilst the qualitative DCE and the Phase 4 study were conducted after the accelerated implementation of VC, the work has informed the development of a treatment pathway that will be implemented in practice. A model of the treatment pathway can be seen in Figure 16 on page 234 and the underpinning theory is presented within Section 9.5 on page 219.

9.9 Reflexivity

This PhD thesis is the culmination of 42 months of new learning and hard work. Over this period, the context of the research has changed as the COVID-19 pandemic led to VC becoming an established modality for patients to attend outpatient appointments. Reflexivity is a process of thoughtful, self-reflection on the relationship between the researcher and the subject of enquiry[253]. In this section, I offer a reflexive account of how my ideas have changed and how my career has been reshaped over the course of my PhD.

9.9.1 Background

Since I started my career as a physiotherapist in 2010 I have interacted with hundreds of patients. I have worked at the Royal National Orthopaedic Hospital in Stanmore (RNOH) since 2011. The RNOH is a tertiary centre where patients travel from all over the UK to access their care. Many of the patients I worked with were challenged by the long journeys to the hospital. I often discussed the potential of virtual consultations (VC) with patients, which shaped my perspectives. It was through these experiences I developed an interest in remote consultations. I believed, at the time, that it would be 'easier' for patients to have a VC as it would overcome the need for patients to have to travel. I undertook an MRes in 2014 where I investigated the acceptability of patient preferences.[48,49] This work demonstrated, to me, that although it might be 'easier' for patients to have a VC, F2F care was more acceptable to patients in a range of different scenarios. The acceptability of VC was situational and I wanted to explore this in more detail through a PhD. I fully recognise my opinions of the research topic were shaped before I had started my PhD.

I enjoyed my role as a research physiotherapist in between my MRes and PhD. I was one of many clinicians who felt empowered to question what we do within the organisation. Over time, I started to see my role as a 'challenger'[254] within the system, which I was aware continued to make some senior 'incumbent' clinicians[254] feel uncomfortable. Some senior clinicians reminded me that I was still a 'junior' clinician. I became more driven towards a career in research.

My pre-PhD years were a process of discovery. I discovered where my interests lay and I developed a passion for applied health research whilst continuing to try and develop clinically. My ambition and drive have been, on occasion, mistaken for arrogance by some more experienced people working in healthcare. In one exchange with an experienced senior clinician, it was pressed upon me that expertise arose from 'years served' rather than different ways of thinking. I shared my ambition of becoming a consultant physiotherapist and I was told I 'still had another 15 years to go'. This led me to embrace the narrative of being a clinical academic 'trailblazer'.[255]

During this time, I became aware of that some people viewed my deviation from being a full-time clinical physiotherapist, whilst I strove to achieve my clinical academic career goals, as "cutting corners". I also became aware that my clinical credentials were perceived to be diluted through my dedication to spend time developing as a researcher. My perception was that some people viewed the protected time I had dedicated to research as inferior to time spent treating patients.

9.9.2 A plan for clinical action

My PhD was inspired by my clinical practice. I was also inspired by a Speech and Language Therapist colleague who was undertaking a funded PhD at the time, our Physiotherapy Research Lead and various colleagues I had met through national networking. In 2013, I was unsuccessful with an internal charity bid. I felt passionate about improving a rehabilitation service I was working on at the time and the bid was to develop the service to improve patient care. The feedback from the grant critiqued my lack of research methods awareness and I was encouraged to pursue training in research methods.

I was disappointed with the outcome, but over the following two years, I collected patient outcome data about the service and presented a case to improve the way it was delivered. In 2015 I was appointed to a clinical academic role in the NHS and I facilitated changes to the service that were later shown to improve patient care. Our service evaluation was presented at a national conference in 2019[256] and I was proud of my contributions to making changes to patient care. Through other projects[257-260] I experienced making changes to practice, which ignited my passion to do a PhD. I wanted to address the skills gap that contributed to the downfall of my previous funding application. I also felt strongly that I wanted to conduct robust research that could inform change to clinical practice.

9.9.3 Philosophy

Prior to my physiotherapy degree, I had always preferred science subjects at school, believing they would set me up for a career in healthcare. I opted for biology, chemistry and physics over sociology, politics and art. The subjects I chose had a similar ontological and epistemological perspective; physical things cause physical effects; you can understand causation through experiments in a lab.

As a physiotherapist, I found manual therapy and the biomedical model was suited to this way of thinking and I was focused to equip myself with the skills to become a clinical expert within the field of musculoskeletal physiotherapy. I attended several weekend courses to develop my knowledge and forge a path to becoming a specialist. Following a competency-based framework to development provided me with a roadmap for my learning; unofficially, there were certain courses you ‘needed’ to pass to progress from a junior clinician to a senior clinician. I attended several of the courses that suited this narrative and I quickly progressed to a senior physiotherapist. My ‘knowledge’ was grounded in ‘fact’.

In 2017 I applied for an NIHR 3-year fellowship, where I placed an emphasis on the scientific methods for the research. My feedback from a previous unsuccessful application to the NIHR specified the need for more detail on the analysis of my data. My focus turned to the step-by-step methods for the research without due consideration to the underpinning philosophy. At the time, I felt this was needed to obtain funding. I feel this approach was different to a traditional PhD's process of defining the ontology and epistemology of the research at the start. In hindsight, I feel my approach was back to front; I hadn't appreciated the importance of having a good understanding in the philosophical position of my PhD research until I was several months into the process. Once I had defined the ontological (pragmatism) and epistemological (abductive) position of the research, I was able to navigate the conduct of the studies within this paradigm. This proved essential as I made pragmatic changes to the research during the COVID-19 pandemic.

As a clinician, I was used to dealing with a range of data. I feel quite strongly that mixed methods research skills are an important asset to a clinical researcher as this provides the opportunities to address a range of research questions to effect change in practice. I believe that different questions warrant different methods and a pragmatic approach to health services research is a sensible way to approach some of the problems encountered in practice.

Pragmatism was important throughout my PhD. I had to be pragmatic with my ideas and in my response to COVID-19. By being epistemologically pragmatic, I was able to draw together three different types of theory and apply them to explain how patients construct preferences for VC. The fundaments of NPT, BOT and preference theory are different as they look at patient work, patient experience and patient calculations of benefits. An abductive approach enabled me to draw together three different kinds of insights. Drawing on my clinical experience enabled me to practically develop a new theory and apply it to care in both an abstract and practical way.

9.9.4 My role in the research

I was aware of my role within the research and the challenges of being an established member of the department. I had worked across many teams at RNOH, and I was a liked and respected colleague. My profile had grown through my research activities and in my prior role I had supported several people to get involved in research; I won the 'peoples champion' award at the staff achievement awards in 2017.

My recruitment strategy for patients was to exclude anyone I had previously treated. I thought that I would not be able to ask innocent questions, or patients might be willing to 'help' by giving specific viewpoints in favour of VC. In addition, I was mindful that several patients who I had previously treated were being seen by other colleagues in outpatients. I interviewed the majority of patients on-site at RNOH, which could have exacerbated this helpfulness; I often found patients were keen to ‘give back’ because they were happy with their care. I needed to emphasise that I wasn’t ‘for’ or ‘against’ VC but that I wanted to know what their opinion of VC was.

I sent an email to clinicians to let them know about the research, to see if they could identify patients who would be suitable. In the corridor, clinicians would tell me that one of their patients ‘really wants’ VC and they would be suitable. I had to emphasise that I was looking for a range of views. Although I made it clear that I wanted to interview patients who also were not interested in VC I acknowledge that it may be my sample of patients was skewed in the direction of patients wanting to avoid in-person consultations.

I have developed a national reputation as someone who is researching VC. In discussion with colleagues in meetings or at conferences, I needed to clarify my position as not ‘for’ or ‘against’ VC, but as someone who wants to understand preferences. I feel some people (wrongly) assume I want to prove VC works, or get it into practice. My position is nuanced; I want to get VC into practice for the right patient in the appropriate situation. I realise it is also possible that clinicians and managers who were interviewed in Phase 2 and 4 may have felt obliged to present a particular point of view in favour of VC to help the research. I did not find it particularly challenging to recruit colleagues; in general staff members were willing to join the study. Some colleagues were interested in research and wanted the experience of being interviewed in a qualitative study. This may have also skewed viewpoints; colleagues who did not volunteer to enter the study may have been less on-board with VC and would have provided alternative perspectives. Sampling staff members from other sites may have provided different insights.

The use of abduction was helpful as it enabled me to conceptualise the data outside of its immediate context. I took the data through a process of defamiliarisation; I coded the interviews and worked with the codes rather than the raw data. I believe working with anonymised data in a more abstract way enabled me to think more clearly about the phenomenon of interest, rather than reviewing data in context.

9.9.5 COVID-19

When the COVID-19 pandemic hit the RNOH, the context for the research shifted considerably. In March 2020, in a very short space of time, traditional F2F outpatient care was converted to VC. Newspaper headlines communicated the rise in coronavirus cases as the first UK death was reported on the 5th March.[261] I recruited the final DCE participant on 6th March 2020. The decision to stop ongoing recruitment was made the following week following a discussion with my supervisors after at my PhD confirmation review on the 9th March 2020. I battled with the realisation that my PhD had to stop. Overnight, VC had changed from being viewed as an experimental way to deliver care to the *only* way to deliver care. I had not collected the data I planned and I was worried that my overall PhD was going to be negatively affected. In hindsight, I recognise what a unique opportunity this turned out to be. It placed my research area in the forefront of outpatient care delivery and allowed me to be able to apply my findings to practice in real time.

In the initial weeks of the pandemic, I supported the accelerated implementation of VC that took place at RNOH (Appendix A on page 279 and Appendix B on page 299). Whilst these papers are not formally part of my PhD programme, they were informed by the PhD work. The accelerated implementation of VC was a pragmatic response to the pandemic. In keeping with my earlier studies, I wanted to capture insights relating to the implementation of VC and formally evaluate the experience of patients and clinicians in real time. The implementation team and I identified a range of implementation considerations and developed a clear table of lessons learnt for other organisations to learn from.

I personally feel very strongly that the insights I have gained from my research should be freely available to those who need it; my research is funded by the NHS and I believe that the results of the research should positively impact on healthcare. The paper describing the rapid implementation of VC[31] documents the lessons learnt from this. In the eighteen months since publication, the paper has an altmetric score of 145 (ranked 3rd in BMJ Open Quality) and it has been cited 108 times as of May 2022. As the corresponding author, I received several emails from colleagues around the country asking for advice about implementing VC in their settings. I engaged in multiple phone calls and provided advice, based on our experiences at RNOH, at every possible opportunity. I took part in an emergency COVID-19 podcast where I shared our experience of implementing VC at RNOH.[262] In addition to this, I participated in a podcast with 'Radio Brockley' which shared information about virtual consultations with RNOH patient listeners.[263] I had phone conversations with staff members at the Chartered Society of Physiotherapy (CSP) and provided insight into the advice that the CSP could provide to members. I wrote a case study for the CSP website[264] and our paper[31] was featured in 'Frontline',[265] the UK Physiotherapy magazine. I have also presented at several webinars.[252,266-271] I have been invited to present at departmental team meetings and training events and I presented the work at conferences (see Appendix T on page 413). As an expert in the field, I was invited to join the steering group for the CSP and University of Manchester project investigating VCs.

I have been well placed, as a clinical physiotherapist within an NHS department, to share my findings locally. I have presented my findings to the RNOH executive team and People Committee on two occasions (25th March 2021 and 18th June 2021). I am very proud that the pathway presented within the discussion section of this thesis is a model of care that will be implemented at RNOH.

As a clinical academic, I was able to combine my clinical experience with my research knowledge to make valuable contributions to the team. When faced with unprecedented circumstances, I applied my skills as a clinical academic to support patients to receive their ongoing care.

When I was involved in the accelerated implementation of VC I was struck by the appreciation patients showed the RNOH during this time. The hospital offered the choice of phone or video consultations; this was influenced by the findings of my research in Phase 1 (see section 3.4 on page 37) and Phase 2 (see section 4.4 on page 67) and I highlighted to the RNOH implementation team that some patients would struggle with the technology aspects of VC.

Patients were highly satisfied with their virtual care.[31] Patients were grateful to not have to travel to the hospital and risk catching COVID-19. Part of my role in the accelerated implementation team was to collect data on patients and clinician experience; I added a question that asked patients if they would prefer the same modality for the next appointment: 94% of patients would choose a phone consultation again, whereas only 44% would opt for a video consultation again. For clinicians, 49% would opt for a video clinic again. Interestingly, and in hindsight this would have been worth exploring further, the majority of clinicians triaged patients for a phone consultation rather than a video consultation. Whilst this study was unplanned within my PhD, it provided a useful insight – patient preferences are mediated by clinician preferences. This demonstrated to me that a pragmatic service evaluation can be extremely useful and complements research. I shared these reflections in a CSP QI webinar[272] and I am writing a manuscript where I outline the opportunities of bringing research and Quality Improvement closer together in practice that I intend to publish after my PhD.

Our rapid implementation of VC paper reporting these results was published on the 21st May 2020.[31] As corresponding author, I was inundated with requests for advice from colleagues from across the UK. Our team were invited to present at several NHS wide webinars.[252,266-271] These findings inspired the investigations that followed in the CONNECT Project papers 4 & 5, where I investigated the impact of COVID-19 on preference and the role of clinician and organisation preferences respectively.

Once the operational roll out of VC had been established, my attention turned towards clinical practice. The pandemic was taking hold and NHS hospitals were being overwhelmed. Clinical staff were being redeployed elsewhere and the NHS in London were asked to support the Nightingale Hospital, which I volunteered to join. I initially volunteered to support the 'proning' team (to reposition ventilated patients onto their fronts to help their oxygenation). I had experience of working on ITU (I completed one year as a junior physiotherapist in 2010 on an ITU rotation and continued to work on our hospital respiratory rota until 2018) and I worked during the first shift as the London Nightingale Hospital opened to patients. I was on the ward to receive the first patient - a memory I will never forget. I continued to work on the ITU whilst the Nightingale Hospital was open. The NIHR highlighted my contributions during the pandemic within a series of case studies on the role and impact of clinical academics during the COVID-19 response.[273]

I then supported the implementation of our virtual pain management programme at RNOH; I provided advice to the team and the roll out was a success.[274] Additionally, I supported my RNOH colleagues with a systematic review on virtual pain management programmes.[275] I really enjoyed my role of being someone who managed change and I led the development of a manuscript that shared the knowledge and learning from these endeavours.[96]

In the short space of time I took away from my PhD, the context had completely changed. VC had become the only way to deliver care at that point in time. I took the opportunity to investigate the impact of COVID-19 on preferences and submitted an amendment to the HRA for my Phase 3 paper to interview patients who had previously completed the DCE.[191] During these interviews, I asked questions about the impact of COVID-19 on preference. The participants shared their experience of COVID-19 and how VC (either phone or video) was seen as a great way to access their care during the pandemic. All eight patients who had strongly preferred F2F prior to the pandemic said they would have answered the questionnaire differently if it was during COVID-19. Although many said they would be more interested in VC some suggested they would prefer to return to F2F when it was safe to do so. Although this was a small study, it provided me with useful insight into the stability of preference; the pandemic had changed the way people viewed VC, but these changes were not necessarily permanent. My clinical colleagues were increasing the proportion of F2F appointments that were offered, whilst there was still an organisational target to maintain a high proportion of VC. I submitted a further amendment to ethics; I wanted to investigate the range of experiences and perspectives about VC from patients, clinicians and managers. Whilst not planned within the protocol for the PhD, this change in direction due to the COVID-19 situation was important to the thesis and provided useful additional insights to the work.

9.9.6 Reflections on the research

A limitation of my research is that is has been undertaken at only one site. However, within the RNOH, it has been viewed as relevant and credible. I shared my findings with the clinical teams and the pathway outlined within the discussion (please refer to Figure 16 on page 234) will be implemented in practice. I am proud of this impact. I do not think this would have been possible without being embedded within the organisation; I have corridor conversations, I pick up things, I contribute to team meetings and I am accessible to my colleagues, who know they can contact me to discuss anything related to my research or ask for support with their work. I have been able to build on the relationships I have forged over the past 10 years. I believe that being a researcher, in residence within an NHS organisation, has allowed me to leverage change in a way that has benefitted our patients at the RNOH.

The benefits of the research being at only one site have been illustrated through the application of findings to practice. Although the results are not necessarily directly applicable elsewhere, the pragmatic and abductive approaches taken have supported the development of models that are transportable to other organisations. I am told my journey from junior clinician to senior researcher has been inspiring and I have supported others to progress along the NIHR Clinical Academic Pathway. This does create pressure to ‘deliver’ on my fellowship and be a trailblazer for clinical academics.[255] Therefore, I have tried to exploit opportunities to showcase the potential role for clinical academics through my research.

The findings from the early work of my PhD contributed to the design and accelerated implementation of VC during the pandemic. These activities have changed the way I am viewed within the system. Whilst I have not enhanced my clinical mileage over the last three years (except for my respiratory skills, which undoubtedly did improve!), I have increased my impact as a clinical academic. The COVID-19 pandemic created a serendipitous situation; albeit unplanned. I was able to conceptually leverage my knowledge and apply the findings of my research in practice. I will continue to be a challenger[254] in practice. In my new, non-clinical role as a research and improvement physiotherapist, I will apply the findings of my research to inform the ongoing sustainable use of VC.

9.9.7 How this work shaped my career

I previously referred to how I felt judged as a clinician based on a specific value set: my clinical mileage and my commitment to clinical treatment. During the pandemic, I perceived a shift in how I was seen; I was known as someone with important clinical experience, someone with working knowledge of implementation science, an understanding of the VC literature and someone who brought valuable insights from recent experience of research conducted on the use of VC within the organisation. I possessed cognitive authority[121] during the accelerated implementation of virtual consultations.

During the course of 2020, I spent time away from my usual clinical team. I was not part of the RNOH clinical team's pandemic response as I had been focused on the implementation of VC. I then worked at the Nightingale Hospital in London. I continued my PhD mostly from home and my physical contact with colleagues was minimal. I received invitations to offer insights about my ongoing research; I have now presented to the RNOH Executive Team twice. I wouldn't have dreamed of doing this before the pandemic.

Saying 'yes' to things and pursuing different activities provided me with a range of learning opportunities. I now find myself in a position where I do not hold a clinical caseload within my current role. I was previously driven to develop as a 'clinical academic': treating patients whilst leading research. In hindsight I find it surprising that I now find myself in a non-clinical role. I am excited and stimulated by the non-clinical aspect of this, but I am unsure as to how sustainable and effective this will be for me in the long-term without clinical contact. I am still trying to determine how I am seen and how I see myself within the NHS; this non-clinical hybrid research and improvement role I have developed into does not seem to have a clear label or an identity.

COVID-19 had a transformative effect on both my PhD journey and on me as an individual. I see myself differently now. My career has been shaped by these events. I have had opportunities to grow as a person and as a professional. My research has demonstrated to me that I can contribute to the lives of patients through pragmatic research. Although I have followed opportunities to pursue my goal of leading change, I am aware that I may be at a disadvantage if I do not treat patients as part of my job plan.

I have benefitted enormously from my PhD. I have had the time and the opportunity to challenge the way I think and see the world, which has led to me being able to make impactful contributions to VC implementation at the RNOH and other hospitals. I am hopeful that I can continue to facilitate change in clinical practice for many years to come.

9.10 Future Research

This thesis presents the cumulative development of a theory of patient preferences for VC. Recommendations for future research are outlined within each empirical paper from each of the phases of the CONNECT Project (Phase 1: section 3.5 on page 51; Phase 2: section 4.5.1 on page

101; Phase 3: section 5.6 on page 126; Phase 4: section 8.5.1 on page 199). In this present section I outline key priority areas for future research.

The COVID-19 pandemic led to rapid re-design of services to meet hospital social distancing requirements. These implementation endeavours were celebrated at RNOH and elsewhere; the rapid implementation of VC was a success. Many clinical guidance and practice-based papers[173,198,202,276] and implementation studies[274,277,278] were published to provide guidance about the conduct and implementation of VC in practice. Although there are several examples of research published that reported high levels of satisfaction from patients with VC,[34,37,39,197] there are fewer examples that focus on the negative consequences of VC in practice.[199] Patient and clinician satisfaction was reported during the rapid roll out of VC at RNOH (Appendix A on page 279 presents a description of the accelerated implementation of VC at RNOH; Table 36 on page 299 presents a summary of feedback from end of clinic reviews during this work). Patients reported a mean satisfaction score of 90% in favour of VC, whereas only 36% of this group indicated they would choose a VC again. Patients who experienced VC at RNOH were grateful for the opportunity to receive virtual care during the pandemic, which may have led to high levels of satisfaction (see Table 30 on 190 for quotes relating to *congruence*). The fact that satisfaction does not indicate preference is noteworthy; research in this thesis concluded that the work patients need to do changes with VC[98] which will shape patients' experience and preferences[99] for VC. Future research, that focuses on patient experience rather than satisfaction, is essential to understand the consequences of VC for patients.

Within this thesis, clinician and organisational preferences were shown to influence patient preferences (see Figure 15 on page 206). Table 30 on page 190 provides an example of empirical data arising from clinician interviews during phase 4, where key factors around the norms of practice (such as safety and effectiveness concerns) were highlighted. Whilst perspectives about the future of virtual physiotherapy provide useful and inspirational insight,[170] there is still work to be done around the suitability and role of VC. It is highly likely, that for clinicians to prefer VC they will need to have confidence in VC's suitability. No randomised trials have been conducted on the effectiveness of VC versus F2F care since the COVID-19 pandemic. The healthcare context has changed considerably over the last two years and many services now offer VC to patients as standard practice. Future research should look to investigate the effectiveness of VC versus F2F care.

Within this thesis, a model of a pathway of care was offered (see Figure 16 on page 234). Future research should investigate the effectiveness, implementability and impact of the pathway on patient and clinician experience. Whilst this model of a pathway of care was developed based on research at RNOH, it is likely that this will be transferrable to other settings. Future research should investigate the role of pathways that take into account patient preference for VC in practice.

Whilst the theory offered in section 9.5 on page 219 was developed based on VC, the constructs of the theory are abstract and could be applied to other aspects of healthcare. A particular interest of mine is adherence to clinical guidelines. If a physiotherapist was to offer an exercise prescription, patients would be required to implement this. The patient's ability to implement the exercise prescription would be dependent on their situation. The situation and implementation process will input into a total subjective comparative evaluation and a patient would *choose* whether or not to implement the exercise prescription in practice. This theory of patient preferences could be applied to other settings and contexts and future research should investigate the utility of a theory such as this on being able to explain treatment choices across healthcare. Future research should look to apply and refute or extend this theory of patient preferences across different healthcare settings.

9.11 Thesis Conclusions

This thesis aimed to identify, characterise and explain patient preferences for VC in orthopaedic rehabilitation (section 1.5.2, page 7 for thesis aims). The objectives were to understand the 'work' of being a patient when using VC and how this influences preferences, the factors that influence patient preferences for VC, the relative importance of factors that influence patient preferences for VC and what a 'minimally disruptive' VC supported orthopaedic rehabilitation pathway looks like in practice.

Phase 1, a systematic review of qualitative studies reporting VC in orthopedic rehabilitation[98], found that the use of communication technology changes the work of being a patient (page 33). The change in work required of patients can be both burdensome (it makes it harder for patients to access their care) and beneficial (it makes it easier for patients to access their care).

Phase 2, a qualitative interview study with patients and clinicians[99], identified key factors that appear to influence patient preference for virtual consultations in orthopaedic rehabilitation. A series of questions, based on these factors, were developed to support the identification of patient preferences in a way that could be applied to a pathway of care (page 90).

Phase 3, a Discrete Choice Experiment (DCE)[100], identified the strength of the importance of factors that influence patient preferences (page 121). The follow-up qualitative study[191] in Phase 3b investigated the results of the DCE and the impact of COVID-19 on patient preferences for VC.

Theoretically informative insights were gained to explain the results of the DCE and provide insights into the impact of COVID-19 on patient preferences (page 163).

Phase 4 was a qualitative interview study that identified mechanisms that explain how preferences are decided for VC and how these relate to organisational and clinician preferences. The study explained patient preferences through the accumulation of several pieces of work as VC changed from an experimental clinic to a compulsory form of service delivery during the COVID-19 pandemic. The study presented a conceptual model of preference formation.

This PhD thesis draws together a qualitative evidence synthesis, a discrete choice experiment and three qualitative investigations to present a theory of patient preferences for virtual consultations. As this theory was developed, it was translated into action as it was incorporated into the accelerated implementation at the Royal National Orthopaedic Hospital during the COVID-19 pandemic. The theory of patient preferences for virtual consultations drew on preference theory[18], Normalisation Process Theory[16] and Burden of Treatment Theory[17] to explain how preferences are formed and are orientated in practice. The thesis has demonstrated how the theory can be applied to clinical practice and a minimally disruptive model of a pathway of care was developed (Figure 16 on page 234).

Although the COVID-19 pandemic led to the accelerated implementation of VC, the question remains whether VC is a short-term fix or a long-term solution. The conversation has certainly started but the debate around patient preference is far from over. The findings from this thesis underline the importance of an understanding of patient preferences for VC in healthcare policy and routine clinical practice.

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Table of Appendices

Table of Appendices

Appendix A Rapid implementation of virtual clinics due to COVID-19: Report and early evaluation of a Quality Improvement initiative

This paper has been published in BMJ Open Quality and is included as a 'published version'. The full reference for this publication is: Gilbert, A.W., Billany, J.C., Adam, R., Martin, L., Tobin, R., Bagdai, S., Galvin, N., Farr, I., Allain, A., Davies, L. and Bateson, J., 2020. Rapid implementation of virtual clinics due to COVID-19: report and early evaluation of a quality improvement initiative. BMJ open quality, 9(2), p.e000985. The formatting, spelling, and referencing for this paper are presented according to the journal's style requirements. In line with the Creative Commons license under which this paper was published, and the publisher's rights and permissions for open access publications, no additional permissions are required to include this article in this thesis as long as the appropriate citation is made.

A.1 Abstract

Background

The outbreak of COVID-19 has placed the NHS under significant strain. Social distancing measures were introduced in the United Kingdom in March 2020 and Virtual Consultations (via telephone or video call) were identified as a potential alternative to face-to-face consultations at this time.

Local Problem

The Royal National Orthopaedic Hospital (RNOH) sees on average 11,200 face-to-face consultations a month. 7% of these are delivered virtually on average via telephone. In response to the COVID-19 crisis, the RNOH set a target of reducing face-to-face consultations to 20% of all outpatient attendances. This report outlines a Quality Improvement initiative to rapidly implement Virtual Consultations at the RNOH.

Methods

The COVID-19 Action Team, a multidisciplinary group of healthcare professionals, was assembled to support the implementation of Virtual Clinics. The Institute for Healthcare Improvement approach to Quality Improvement was followed using the Plan-Study-Do-Act (PDSA) cycle. A

process of enablement, process redesign, delivery support and evaluation were carried out, underpinned by PDSA principles.

Results

Following the target of 80% Virtual Consultations being set, 63% of consultations were delivered virtually during the first week and 85% of consultations delivered virtually during the second week. Satisfaction scores were high for virtual consultations (90/100 for patients and 78/100 for clinicians) however, video consultations would be preferred less than 50% of the time outside of the COVID-19 pandemic. Information that will support the future redesign of outpatient services were collected.

Conclusions

This report demonstrates that virtual consultations can be rapidly implemented in response to COVID-19 and they are largely acceptable. Further initiatives are required to support clinically appropriate and acceptable virtual consultations beyond COVID-19.

Registration

This project was submitted to the Royal National Orthopaedic Hospital's Project Evaluation Panel and was classified as a service evaluation on the 12th March 2020 (Ref: SE20.09).

A.2 Introduction

The outbreak of 2019 novel coronavirus (COVID 19) was first reported in Wuhan, China and reached the United Kingdom on the 31st January 2020. On the 11th March 2020, the World Health Organization declared the COVID-19 virus a pandemic.[279] COVID-19 mainly affects the upper respiratory tract and clinical symptoms associated with COVID-19 can be mild, severe or critical.[280] The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Social distancing measures have been established with the UK public being placed on 'lockdown' from the 23rd March 2020[134] to avoid transmission of the disease.

Physical attendance at outpatient clinics put patients at risk of spreading COVID-19. Virtual Consultations (VC) are an important way for patients to access their care without this risk. There has been a surge in the interest for VC in response to COVID-19,[135,136] with the National Health Service in the United Kingdom releasing new Information Governance guidance for their use.[30]

The Royal National Orthopaedic Hospital (RNOH) is a specialist tertiary centre in Middlesex, UK. On average, 11,200 monthly face-to-face consultations are held across two outpatient sites at the RNOH across a range of pathways.

The RNOH was actively developing virtual clinics prior to COVID-19 in line with the NHS Long Term Plan[4] regarding reduction in face-to-face outpatient appointments. One of the project team had previously investigated the acceptability of virtual consultations[48,49] and is actively researching this area.[97] In November 2019, the operational management team agreed to use the virtual consultation platform Attend Anywhere with the licence for use granted on the 27th February 2020. On the 5th March 2020, in response to the growing COVID-19 crisis, a target of reducing face-to-face (F2F) clinics to 20% of all outpatient attendances was set. The COVID-19 Action Team was established to support the delivery of this target.

In June 2018, the RNOH committed to applying the Institute for Healthcare Improvement (IHI) approach to Quality Improvement (QI) to all applicable change processes and established an improvement team to support delivery of this strategy. The IHI method is a formal approach with a clear process to interrogate the change being proposed and for thinking through, conducting and analysing the change ideas in a Plan-Do-Study-Act (PDSA) cycle. Normally the improvement team trains and coaches front line teams to lead and deliver changes, but COVID-19 needed a rapid response, so experienced and skilled members of the improvement team joined the COVID-19 Action Team to ensure an improvement approach at pace.

The aim of the project was for 80% of all RNOH outpatient appointments to be delivered as virtual consultation (using Attend Anywhere or telephone) within 11 days of the target being set (target 80% as of the 16th March 2020). The Secondary aim was to collect data that supports the design of a substantive legacy of VC post COVID-19.

A.3 Methods

A.3.1 Early Enablement

The goal of 80% Virtual Consultations (VC) was set and communicated across all clinical staff. Clinical staff were asked to screen clinical lists and identify patients suitable for a VC [either a telephone consultation (TEL) or a video consultation (VID)] rather than a F2F for the next three weeks. Software upgrades and hardware deployment began immediately and was completed within 24 hours across both sites at the RNOH.

A.3.2 Process Redesign & Delivery Support

The COVID-19 Action Team was established to rapidly implement VC across the RNOH. The multidisciplinary team consisted of operational management and strategists, a project manager, quality improvement personnel, a clinical research fellow and data management support. The team provided a variety of skills and resources to facilitate implementation. Daily meetings were scheduled to identify processes that needed to be redesigned to facilitate VC. Issues and actions logs were created to identify and overcome obstacles to implementation.

A.3.3 Measures

The overall approach to assess the impact of the intervention was straightforward; the % of patients undertaking a VC (TEL or VID) compared to a F2F. A combination of manual data collection of clinic lists and online RNOH patient management system was used to identify the proportion of patients undergoing VC. A simple, bespoke patient and clinician satisfaction questionnaire was developed to capture patient and clinician experience. These data collection methods were supplemented with informal observation and PDSA cycles.

A.3.4 Analysis

Descriptive statistics were used to analyse quantitative data. A thematic analysis of qualitative data was used to illustrate underlying reasons behind the quantitative data.

A.3.5 Project registration

This project was submitted to the Royal National Orthopaedic Hospital's Project Evaluation Panel and was classified as a service evaluation on the 12th March 2020 (Ref: SE20.09).

A.4 Results

Between 5th – 27th March, a large number of PDSA Cycles were undertaken simultaneously across the five main areas below to support rapid implementation of both telephone and video virtual clinics. Co-ordination of activity and management of interdependencies was managed via the daily implementation group teleconference. PDSAs were considered and appropriate action to expand, redesign or retest was agreed. These are shown in Table 34 on page 284.

Appendix A

Table 34 PDSA Cycle Outcome

	PDSA Group 1: Administrative Processes	PDSA Group 2: Clinician Training & skills Development	PSDA Group 3: Install technical infrastructure to deliver virtual clinics at scale	PDSA Group 4: Design & Implementation of Clinical Pathways	PDSA Group 5: Patient & Clinician Experience
No of Cycles	12	9	8	3	4
Plan	To ensure standardised administrative processes are in place for effective booking and running of virtual clinics.	To understand clinical experience of virtual clinics across RNOH. Design 'virtual clinic' training tools available to all clinicians.	To equip all outpatient areas with the equipment required to run virtual clinics effectively at scale.	To ensure patients are able to access the required medication and diagnostics when attending clinics virtually.	To provide video and telephone appointments as a good alternative patient experience.

Do	Map and redesign administrative booking process. Design new Clinic Outcome Form (COF) process to support virtual clinics from remote locations. Design and publication of standardised booking & patient communication tools. Admin leads allocated for each clinical pathway for	Meet with teams experienced in telephone clinics and model processes. Clinical input into Attend Anywhere support tools. Trial with a clinician prior to go live and update support package. Allocation of daily 'Floorwalkers' to manage queries & opportunistically train within clinics.	Licence approval for Attend Anywhere. Acquisition of headsets and webcams. Increase the number of external telephone lines from 60 to 200. Update all outpatient computers with latest version of Chrome. Information leaflet re installing headsets and webcams.	Work with the Pharmacy Team to map the new medication pathway and Standard Operating Procedure prior to 'go live'. Design and implement new transport booking and cancellation process. Identify demand for essential diagnostics with clinical teams and design process to access as close to home as possible.	Call each patient to explain and offer alternatives. Design video appointment access details (specific to speciality) and patient guides. Created page on RNOH website with links to speciality waiting area as alternative access route. Establish process for monitoring patients waiting for video calls via admin screen.

	refinement, approval and cascade of new processes. Manage the closure of Bolsover St outpatient facility at RNOH.	Daily clinic review feedback forms to inform troubleshooting tools & to refine co-ordination of outpatient clinics.	IPC Policy for sharing headsets. Create equipment log. Include technical support in floorwalker role.		
Study	PDSAs co-ordinated by Outpatient Managers. Daily feedback enabled continuous improvement with updates published to intranet folder & cascaded to frontline.	Floorwalker roles important for troubleshooting. Face-to-face training more effective than training tools alone. Clinician blogs / stories shared via internal mail and social media.	Floorwalker roles important to support where setting up. Process improved by gaining clinic list details 24 hours in advance. Excellent support from responsive IT Team enabled rapid acquisition	Pharmacy process in place with support from Information Governance Lead. Transport booking process trialled on paper process, now electronic. Priority Outpatient Pathways being agreed	Feedback collected via online survey at end of video appointments & paper 'end of clinic reviews' including patient feedback following telephone clinics. Data analysed daily to ensure real time feedback

	Recording of clinic type on appointment record to assist data collection.	Training tools published to central intranet folder.	of kit and updates required.	and criteria for F2F / Video / Tel clinics being reviewed with clinical leads to understand what demand will be for diagnostics moving forwards.	so that any issues and suggestions are actioned quickly.
Act	Implementation of new tools. Clinic booking process standard operating procedure (SOP). COF process for remote working.	Training Tools in place. Attend Anywhere Patient Video. Advice for conducting telephone consultations (based on 'Human Factors' principles).	All equipment and upgrades in place.	New Pathways in place. Supply of Medicines from RNOH Virtual Outpatient Clinics SOP. Currently access to bloods and diagnostics requiring face-to-face appointment. New pathways currently in	Clinician and patient feedback mechanism in place. Ongoing data collection and more detailed analysis required to inform future practice and sustainability post COVID-19.

	Patient information leaflets. Development of an RNOH Patient[195] and generic NHS[281] video. Patient telephone script and email confirmation templates. Support & executive 'thank you' to admin staff for achievement of this challenging role.	Attend Anywhere procedures & trouble shooting tools. Staff Webinar.		negotiation with Commissioning Leads and NHS England.	

Figure 17 (page 291), Figure 18 (page 291) and Table 35 demonstrates the change of % of the different consultation types at the time of target 80% VC, with the majority of VC's conducted using TEL.

Table 35 Summary of results

	Baseline Week 1 (w/c 2nd March 2020)	**Baseline Week 2 (w/c 9th March 2020)**	(target 80% VC)	**VC Week 1 (w/c 16th March 2020)**	**VC Week 2 (w/c 23rd March 2020)**
% F2F (number)	92.73% (3634)	92.27% (3535)		37.31% (529)	15.14% (194)
% Vid (number)	-	-		3.80% (54)	6.71% (86)
% Tel (number)	7.27% (285)	7.73% (296)		58.89% (835)	78.14% (1001)
Total Consultations	3919	3831		1418	1281

End of Clinic Reviews and Patient Feedback

As outlined in Table 36, a simple evaluation tool was developed to capture patient and clinician experience of virtual clinics from the 16th March 2020. These results are demonstrated in Table 36. Feedback was reviewed and discussed in daily COVID-19 Action Team meetings.

Appendix B

Table 36 Summary of feedback from end of clinic reviews in VC week 1 & 2

		Number of responses	Mean Satisfaction Score	Range	Virtual clinic again?
Patient Feedback	Phone	111	90/100	(30,100)	94% Yes
	Video	28	90/100	(0,100)	36% Yes
Clinician Feedback	Phone	52	N/A	N/A	N/A
	Video	51	78/100	(0,100)	49% Yes
Virtual Clinic Total		**242**	**87/100**	**(0,100)**	**73%**

Patient satisfaction scores are high (90/100) for both telephone and video consultations. However, patients were more likely to consider using phone consultations again after a phone appointment (94%) of patients than video consultation patients wanting a further video appointment (36% of patients).

Open ended qualitative data provided an overview of some of the potential reasons for high satisfaction for patients. These included:

- The offer of an alternative to F2F during the COVID-19 pandemic
- Reduced travel times
- Reduced waiting times
- Reduced impact of travel on symptoms

Open ended qualitative data also provided an overview of some of the potential reasons for high satisfaction for patients. These included:

- VC worked particularly well when the patient was already known to the clinician
- VID was useful to assess range of movement or visually assess a patient
- VC ran quicker than traditional F2F clinics

Common reasons for poor satisfaction for both patients and clinicians included:

- Variable sound and picture quality
- Low confidence levels with using the technology; both patients and clinicians required support with setting up the hardware and software

- Equipment issues with outdated software (for example, using internet explorer or not having up to date phone / tablet / computer operating system software)
- Patients occasionally were left waiting in the virtual waiting area without having been acknowledged by the hospital

These feedback forms were reviewed on a daily basis and informed the PDSA cycles.

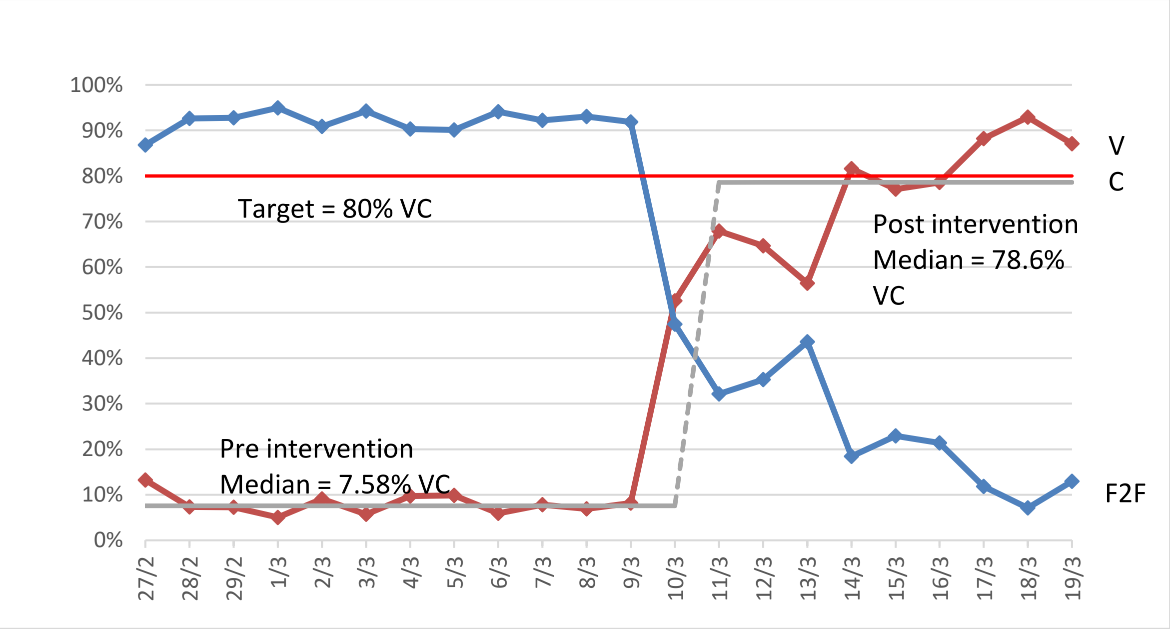

Figure 17 Run Chart of Virtual and Face-to-face Outpatient Clinics

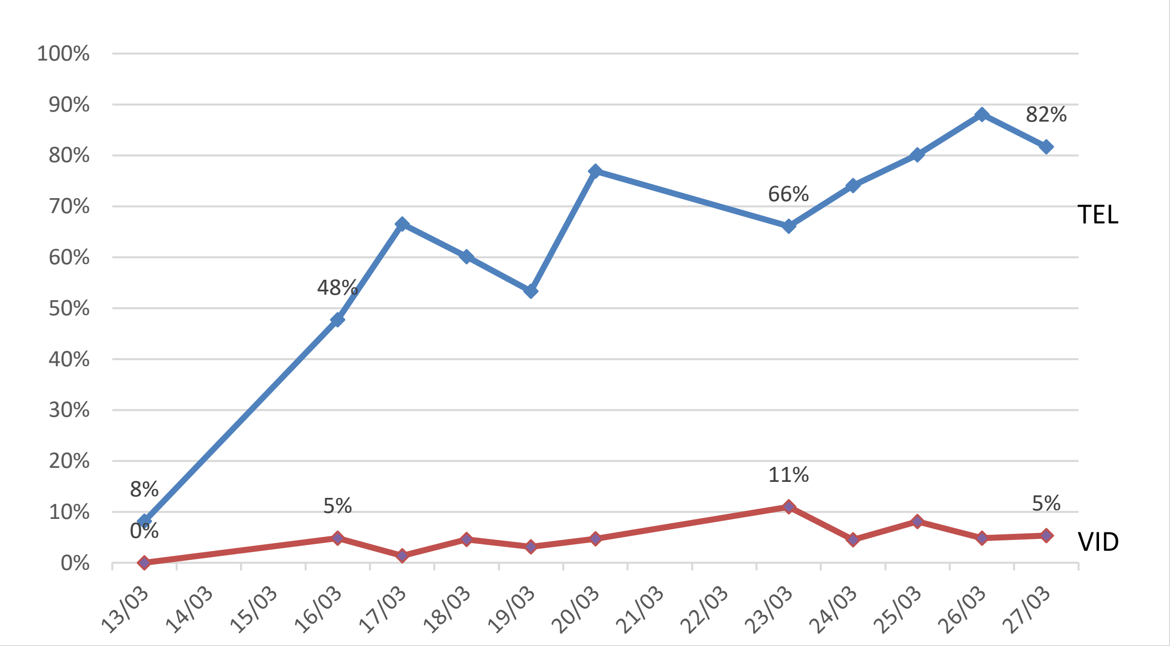

Figure 18 TEL and VID clinics - proportion of total outpatient activity

Throughout the Quality Improvement initiative, the COVID-19 Action Team collected information to support the future rollout of VC after COVID-19 subsides. We now have in place all the technical elements to deliver outpatient appointments in a variety of ways appropriate to patient and clinician preference and convenience, and in the most effective way for the organisation. Prior to restarting a full outpatient service, a formal evaluation of patient and clinician experience will be undertaken. In addition, patient and staff stakeholder sessions will be held to inform any potential redesign of traditional outpatient models of care to incorporate VC.

A.5 Discussion

The COVID-19 Action Team achieved the set goal of 80% virtual consultations (VC) by week 2. The use of QI methodology, specifically the use of repeated PDSA cycles, was essential to identify and overcome barriers to VC implementation.

The rapid implementation of Virtual Consultations (VC) was achieved due to the considerable resources directed to support it. The RNOH Senior Leadership Team clearly communicated VC as an important way to manage patients during the COVID-19 pandemic. The formation of the COVID-19 Action Team provided the initial resources to support patients and clinicians across the RNOH to engage with VC. The multi-disciplinary nature of the COVID-19 Action Team, with the ability to draft in extra personnel as required, ensured a wide range of skills and abilities to respond to the dynamic and complex circumstances of implementation. Whilst this Quality Improvement initiative was delivered in one Trust across two sites, the lessons learned are relevant in other healthcare settings.

The NHS long term plan clearly sets out the requirement of digital to support NHS services[4]. VC feature heavily on the RNOH Trust objectives; with VC due to be Phased in. The catalyst for VC implementation was the COVID-19 pandemic. This unique situation required urgency to rapidly implement these changes; patients and staff were largely understanding of the necessity for VC and grateful for the swift response to the pandemic.

The RNOH is dedicated to supporting the use of VC, in accordance with the NHS long term plan.[4] The key focus of the COVID-19 Action Team was primarily to implement VC at pace. A secondary objective was to collect data that supports the design of a substantive legacy of VC. Further stakeholder engagement initiatives and use of frameworks[126] or theories of implementation[70] will support this. As we have found in this Quality Improvement initiative; multi-disciplinary working is key. Table 37 on page 293 outlines our lessons learnt from the implementation of VC.

Table 37 Lessons Learnt regarding rapid implementation of Virtual Clinics

Lesson	**Comment**
It is important to have a multi-disciplinary team when rapidly implementing VC	The COVID-19 Action Team possessed a range of skills and abilities. The operational management and leadership provided the group with oversight of the workings of the RNOH and the strategic direction in response to COVID-19. Higher level support (from the Chief Operating Officer) facilitated engagement across RNOH. An assigned project manager directed the changes in response to the changing strategy of the trust. Quality Improvement Personnel (QI) provided expertise on the change methodology required to facilitate a rapidly changing service. The use of QI provided a framework to identify and overcome unexpected issues. Insight from a clinical researcher helped identify potentially unexpected clinical issues. Access to data management support was essential to the success of the rapid implementation by providing real-time evaluation data. Flexibility across the group was essential to cross cover roles and responsibilities, particularly during the complex environment of COVID-19 when the system was undergoing rapid changes.
The presence of QI experts and the use of QI methodology facilitates rapid change.	The COVID-19 Action Team was strongly outcome and action focused and the improvement expert was able to influence the approaches to ensure learning was captured and built upon. A skilled improvement advisor added structure and form to the project whilst facilitating improvement at the pace required. The PDSA approach offered a pragmatic framework to build sustainable change.
It is important to have daily briefings across the team when rapidly implementing VC	Daily virtual briefings with all members of the COVID-19 Action Team ensured optimal communication. Assigning a meeting chair and logging issues and actions ensured focus. Having all members of the MDT present allowed for real-time troubleshooting and action planning.
It is important to have effective leadership when rapidly implementing VC	The strategy of the RNOH was clearly communicated to members of the Trust community. Setting a timed and distinct goal provided staff with clear direction. The allocation of resources to facilitate the goal provided the community with the support to enact the goal.

The success of VC is reliant on engaged staff.	RNOH staff were flexible, proactive and supportive of the requirement to rapidly implement VC due to COVID-19. This supported a sense of common purpose, which was built upon by project leads through continuously listening and reacting to issues raised by colleagues, leading to greater engagement and commitment to the shared goal.
The success of VC is reliant on adequate Information Technology support	The IT team rapidly rolled out a programme of software upgrades and installed hardware for VC across the RNOH within a short space of time. The Information Technology (IT) team prioritised COVID-19 related tasks during this period.
The success of VC is reliant on adequate Information Governance support	The IG team were responsive to COVID-19 and provided clear and distinct guidance and troubleshooting for staff who were expected to work differently during this time.
The success of VC is reliant on adequate administrative support	The admin teams responded quickly and effectively to the rapid implementation of VC due to COVID-19. The admin staff were required to call patients to inform them of changes to their care. The teams conducted a huge number of challenging conversations over a short space of time.
It is important to undergo regular evaluation when rapidly implementing VC.	After each consultation and at the end of each clinic, the feedback was studied, issues logged and communicated across the COVID-19 Action Team and actions either taken immediately (eg technical considerations) or agreed at the daily review meetings. These were conceived and presented as PDSA cycles.
Creating narrative through effective communications	Effective staff and patient communications were central to the success of the project. Staff were supported to share their stories early on, alongside creating easily accessible technical advice and training materials. Examples include clinician blogs; a patient video; training webinars; highlights via existing executive updates; podcast; use of intra and internet to access up-to-date tools.

The majority of patients who underwent VC elected for a phone call (TEL) rather than a video call (VID). TEL’s have previously found to be equally clinically effective compared with usual care[102] although TEL’s were associated with lower patient satisfaction. A qualitative interview study with participants from the PhysioDirect telephone and advice service[20] found that the telephone service was broadly acceptable but it was described as ‘impersonal’ and many were skeptical about the ability of telephone consultations to achieve the goal of the session. For many the service provided a ‘route in’ to care. The satisfaction of phone calls in our project was high (90/100) and approximately (94%) indicated they would prefer a face-to-face call in the future. Whilst TEL has proven to be a useful way to manage patients during the COVID-19 pandemic, further work needs to be done to understand its effectiveness and acceptability at the RNOH in the future.

Previous research[49] at the RNOH investigating preferences found that approximately 50% of patients found the use of SKYPE to be acceptable for a follow up consultation. These preferences were situational and fluid; patients stated they might choose VID or F2F under differing circumstances. The COVID-19 Pandemic is a situation which has forced patients to undergo a VC regardless of their preferences. Of those who underwent a VC in our project, approximately half of these indicated they would prefer a F2F for their next appointment. This is in keeping with a report[110] that found that, from a survey of 2000 people, 55% would be willing to have a consultation for advice on an ongoing problem. Further research at the RNOH into preferences will likely sustain a legacy of clinically appropriate and acceptable VC’s.

Greenhalgh et al[108] found that videoconferencing consultations appeared to work better when the patient and clinician knew each other. It is not obvious from our early evaluation data whether or not this is the case in our project. Technical challenges have previously been shown to be prohibitive[108] and those encountered in our project occasionally led to abandonment of a VID. Clinicians often responded to these issues by abandoning the VID and transferring to TEL, or in cases where it was the sound that was mainly disrupted, they spoke over TEL whilst capturing images from VID to enable an assessment. Individual agency and reflexive monitoring played an important part in the successful implementation of VC.[68]

Significant resources were intensively deployed to deliver this rapid implementation of VC. They included three additional members of staff almost full time to support the roll-out, the cost of hardware, software, IT and telephone infrastructure. These costs are rarely reported in the literature[108] and will need to be taken into account when commissioning digitally supported services in the future. Virtual clinics offer potential savings to the NHS which need to be further scoped. Savings for patients included the reduction in time spent travelling and the cost of travelling.

VC is not a novel approach to delivering outpatient appointments in healthcare, but this paper discusses an extremely rapid adoption. To our knowledge, this is the first report of an NHS hospital evaluating rapid implementation of VCs due to COVID-19.

The findings must be interpreted in light of their limitations. This was not a research project but a rapid evaluation of VC implementation. The pace of change led to some missing data which were manually collected wherever possible. The pragmatic approach described here does not seek to test or demonstrate statistical significance. Future research studies evaluating the effectiveness and acceptability of VC are required, particularly as services return to a 'new normal' after COVID-19.

Commitment from clinicians and administrators was initially due to the unusual circumstances of COVID-19 and the imperative to stop all non-essential F2F work, but engagement was maintained by continuous multichannel communications throughout the project. The future goal is to maintain a clinically appropriate level of VC post-COVID-19; the improvement-driven approach described in this paper has led to wide engagement, a clear plan of action and objective data to support this aim.

The implementation was within an orthopaedics setting; however, the findings from this report have been reported in a way to be as general as possible to allow for transportability.

A.6 Conclusion

This Quality Improvement (QI) initiative demonstrates that rapid implementation of Virtual Clinics (VC) could be achieved in response to the COVID-19 pandemic. The rapid implementation of VCs required a dedicated multidisciplinary team, expertise in operational management, QI, clinical care and data analysis. It required whole systems support from the Royal National Orthopaedic Hospital Senior Leadership Team, Information Technology team, Information Governance team, Administrative Teams and clinical staff. This is a pragmatic Quality Improvement initiative that was conducted at pace and must be considered in light of its limitations. To our knowledge this is the first report of rapid implementation of VC's across an NHS Hospital Trust conducted as a consequence of the COVID-19. The findings from this report will be of interest to healthcare organisations looking to convert face-to-face clinics to virtual clinics. A structured and planned approach, utilising QI methodology will be required to facilitate a return to face-to-face clinics as the COVID-19 situation allows.

A.6.1 Acknowledgements

The authors wish to acknowledge several people from the Royal National Orthopaedic Hospital: the Information Technology Team for their support with the hardware and software, the Information Governance Team for their expertise on Privacy Impact, the Research and Innovation Centre for prompt review and registration of the project, the administration staff for contacting patients and the patients and clinicians who participated in the virtual clinics. Finally, the authors are grateful to Kelly Easton whose contributions at the outset were essential to the delivery of this Quality Improvement Initiative.

A.6.2 Author Contributions

AWG, JCTB, RA, LM, RT, SB, AA and LD made substantial contributions to the design of the work. AWG, JCTB, RA, NG, IF and JJB were involved in the collection, analysis and interpretation of data. AWG drafted the work with JCTB, RA, LM and JJB. All authors critically revised the draft, gave final approval of the version to be published and are accountable for all aspects of the work. AWG is the guarantor of the manuscript.

Appendix B Leadership Reflections a year on from the rapid roll-out of virtual clinics due to COVID-19: A commentary

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B.1 Abstract

COVID-19 has changed the way we have delivered care to our patients at our Hospital. Prior to the pandemic, no patient facing video clinics and only a small number of telephone clinics were held. In this paper we share our experience of rapidly implementing virtual clinics due to COVID-19. This commentary is based on focussed discussions between hospital leaders and provides a reflective account and commentary on leadership lessons learnt from the experience of deploying virtual clinics. We outline success factors (being able to capitalise on existing strategy, having time and space to establish virtual clinics, using an agreed improvement framework, empowering a diverse and expert implementation team with a flat hierarchy, using efficient decision pathways, communication and staff attempt to change), technical challenges (patient capability and skills to use technology, patient connectivity and platform capacity) and considerations for the future (sustaining new ways of working, platform selection, integration, business continuity and commissioning considerations, barriers regarding capability and communication, effectiveness and clinical outcomes). Finally, we provide an overview summary of the leadership lessons from this project and identify key areas of focus for delivering successful change projects in future (the vision, allocation of resources, methodology selection and managing the skills gap).

B.2 Introduction

COVID-19 has changed the way we have delivered care to our patients at the Royal National Orthopaedic Hospital (RNOH). Prior to the pandemic, only a very small proportion of telephone clinics were held with no video clinics. On the 5th March 2020, the organisation set a target to deliver 80% of clinics virtually in response to the COVID-19 pandemic, which was achieved by the 16th March 2020. The results are published elsewhere;[31] in summary, the goal was achieved within three weeks through a rapidly deployed process of improvement using the Institute for Healthcare Improvement approach.[282] In this paper we have attempted to share our experience of rapidly implementing virtual clinics and 'lock in' our learning.[283] This commentary paper is based on focussed discussions with RNOH leaders and we attempt to highlight key considerations to enable future success in similar programmes.

B.3 Success Factors

Increasing virtual clinics (VC) at the RNOH was an existing part of the 2019/20 Operational Strategic Plan in line with the NHS Long Term Plan.[4] In November 2019, four months before the COVID-19 response began, the operational management team agreed a platform for video clinics which was live on the 27th February 2020. Senior leadership were committed to increasing virtual clinic activity in advance of the project, meaning the project was organisationally sanctioned and supported with goals communicated throughout the Trust. These preparations for VC provided helpful groundwork for the rapid implementation process. The RNOH does not have an emergency department so was not subject to an immediate surge of patients with COVID-19, though the Trust did establish a new emergency orthopaedic trauma referral pathway enabling acute trusts to free up bed capacity elsewhere in London.[284] There was also a strict limit on the type of activity that could take place at the hospital to help to minimise the spread of COVID-19. This led to an overall decrease in activity through the hospital. In this context, the VC implementation team were afforded a short period of protected time to implement VC.

The RNOH previously committed to applying the Institute for Healthcare Improvement (IHI)[282] approach to Quality Improvement to all applicable change processes and established an improvement team to support delivery. The IHI method provided a clear process to interrogate the change being proposed and for thinking through, conducting and analysing the change ideas in a Plan-Do-Study-Act cycle. The decision to invest in the use of high quality improvement science approaches across the organisation has been made to achieve our organisational goal: 'To be a world- leading orthopaedic hospital with the best patient care and staff experience in the NHS' [285] (p18). Improvement science is at the centre of enabling us to achieve this goal.

The VC implementation team had members from clinical practice, research, improvement, operational management, project management and volunteer services and were sanctioned by the organisation to lead these changes. One of the project team is actively researching this area[97-99]. The multi-disciplinary team was able to make decisions and met daily to maintain a fast pace. This partnership working, drawing diverse individuals from across the organisation, pooled a range of knowledge and skills that were essential to the success of this project. Staff across the trust had access to this expertise via floor walkers on the ground, often consisting of core members of the implementation team and this established clear, responsive and open lines of communication between the implementation team and those delivering the service. In the initial Phases, two daily meetings were held (virtually or socially distanced face-to-face) to capture lessons learnt and to agree the next day's actions.

Implementation of new methods of VC required governance and close collaboration with corporate service stakeholders such as the Information Governance Team (IG) and Digital Services. Wherton et al's guidance on introducing virtual consultations emphasises the need to maintain ongoing dialogue with IT Teams. The need to be flexible during the pandemic led to changes in IG guidance as NHSx advised that it is acceptable to use free videoconferencing tools such as Skype, WhatsApp and/or FaceTime.[30] The project was conducted in collaboration with these internal RNOH stakeholders but not centrally controlled or rigid. The limited bureaucracy and the additional allocation of resources and the increased flexibility of the organisation to make space for VC enabled the team to move at pace. This was possible because VC implementation in response to Covid-19 was a common purpose with clear communication between governance functions and the implementation team; decisions were quickly made and devolved whenever possible. Leaders trusted staff to make appropriate decisions and established a flattened hierarchy. The multi-disciplinary team, with diverse expertise and knowledge, were trusted to operate efficiently and effectively, drawing in a wide range of views and embracing constructive criticism. The implementation team was comprised of multiple professionals from a range of backgrounds and was not limited by a single centralised team's capacity, nor slowed down by any one decision maker.

The aim of the project was communicated widely, consistently and clearly. All-staff communications via email and the intranet explicitly stated, on the 5th March 2020, that there was a target of 80% VC by the 16th March 2020 and that all non-essential face-to-face (F2F) appointments must cease due to COVID-19. This empowered the implementation team to drive the roll-out. The implementation team worked closely with the clinicians to ensure that insights from frontline staff were captured and acted upon. 'Good news' stories were supplemented with accessible data and shared across all staff via email. These stories were celebrated to facilitate engagement elsewhere within the Trust. This is in accord with Woods et al's functional framework for change leaders[286] who highlight the importance of inspiring others to want to make the change through generating enthusiasm and motivating commitment. Social persuasion has been cited as an important component of self-efficacy theory.[287] Senior medical backing from the RNOH's Chief Medical Officer regularly highlighted the work frequently within communications to all staff which helped emphasise the importance and relevance of the work to a wide audience. Establishing an effective learning system allowed the implementation team to learn from these data and present accessible data visualisations, reflecting consistent progress through growing numbers and consolidating performance accomplishments.[287] Enthusiastic clinicians operating as champions of VC has been shown to be an important success factor in VC implementation, whereas those who are unwilling to try it may inhibit implementation.[108] In Greenhalgh et al's study of implementation of VC[108] clinicians were required to take on a number of new roles and practices such as triaging suitability of patients, finding space for VC, troubleshooting IT and set up. The mechanisms of bringing about change can be explained by Normalisation Process Theory,[69] which focuses on the 'work' of implementation. Ongoing, sustained VC implementation will require ongoing, sustained changes to the roles and practices of clinicians. If clinicians are not willing to do the 'work', VC is implementation is unlikely to be sustained.

Staff across the Trust demonstrated remarkable flexibility despite the high demands and short notice that the Covid-19 response required. The Trust initially instituted a command and control style of incident management,[288] establishing a central incident command centre and leadership hierarchy. Alongside this, however, detailed decision making was often delegated to front line clinical leaders. Multiple rapid workstreams were established and decisions were quickly made through a series of daily meetings and cascaded to strategically placed staff members to agree execute agreed actions. Daily learning was shared with the hospital leadership which enabled them to act on the insights gained from front line staff. The implementation team acted in a similar role to 'bedside learning coordinators', which have been described elsewhere and have been celebrated as an effective learning system during the COVID-19 pandemic.[289]

The RNOH has a vision to have the best staff experience in the NHS.[290] Leadership courses and mentorship programmes have been made available for staff at most levels and this may have enabled the devolved leadership witnessed during the pandemic. The value of developing and nurturing leadership at all levels of seniority throughout the organisation has been clearly demonstrated.

B.3.1 Technological Challenges

The pandemic pressures that created the conditions for the rapid roll-out also meant that testing Phases were shorter than would have been previously been planned. The implementation team concentrated resources and IT support at the beginning of the project timeline to support engagement and help to create a knowledge base among staff. This knowledge base enabled peer learning and troubleshooting, lessening the burden on IT infrastructure in the longer term. This shift in work meant that staff delivering virtual clinics were often required to troubleshoot at the same time. Patients who had difficulty with the technology, or did not know how to use the technology, often required significant support to be able to establish a video call with their clinician. The time spent troubleshooting technical issues was seen as a barrier to telehealth by allied health clinicians during the COVID-19 pandemic[172] and it also took away from clinical time and would have been better managed by IT or service experts. Strong links between clinical staff and the IT support and implementation teams were required to support clinicians to escalate troubleshooting issues when these interfered with service delivery.

In some cases, the video call was abandoned. Similarly, some patients had poor internet connectivity and low-quality audio and video which led to suboptimal interactions between patient and clinician resulting in an unsatisfactory patient and clinician experience[31] that is unlikely to have been an effective replacement for a F2F interaction. Poor connectivity can lead to latency, the technology-generated transmission delay, which causes participants to perceive silence at points where talk should occur.[24] Different styles of communication are required in remote consultations[198] and this has forced clinicians to have to change their approach as VC was thrust upon them. Focus on the different types of talk required (such as social, clinical and operational) are important to support longer term VC use.[202] At times, the video consultation platform was not able to cope with the rapid growth nationally and ran out of capacity. These technical challenges led to changes in the patient and clinician interaction and impacted on the enthusiasm and commitment of individuals to make the change to VC.[286]

B.3.2 Considerations for the future

This period of rapid implementation occurred during a worldwide pandemic event and the sustained high pressure helped maintain the pace of change. The roll-out of VC was one of many initiatives that was being asked of staff and there is a real danger, as staff become more exhausted with the stress of everyday work during the pandemic,[291] that we are unable to sustain some of these positive changes beyond the immediate response to COVID-19. In conversations about what the ‘new normal’ beyond COVID-19 might look like, we need to ensure that there are positive legacies from this challenging time,[292] whilst undertaking the important work of re-prioritisation and resource allocation as we look to normality,[293] as well as addressing the backlog of orthopaedic procedures. The organisation recognises that sustained implementation requires ongoing commitment from staff; the creation of a new ‘Wellbeing Lead’ intends to provide support to staff to reset beyond the pandemic and create the capacity for agency for future initiatives.

Embedding change can be a major challenge,[294] particularly as the crisis which created the conditions for the early successes at RNOH are lifted. The approach should seek to build upon the legacy of flattened hierarchies and frontline leadership[295] where all staff champion and drive appropriate use of VC. This requires engagement and feedback from clinicians and patients during any evaluation. The implementation team were sanctioned by the organisation to implement changes and were therefore seen to have *cognitive authority*, defined by Hunt and May as being seen by others to ‘possess qualities of competence, trustworthiness and credibility in meeting their accountabilities.’[121] Cognitive Authority Theory[121] explains negotiation processes in which individuals manage important relational aspects of inequalities in power and expertise. An understanding of these processes is important for change management in the post COVID-19 era; should rigid hierarchies be introduced and strict performance targets imposed, inequalities of power and the potential for individuals (such as frontline leaders) to mobilise resources for change will be diminished. Heimans and Timms[296] offer a useful insight into the balance of power; ‘old power’ is described as working like a currency and held by few whereas new power is described as operating like a current and made by many. The Large Scale Change model recognises that transformational change is more likely to happen cross-organisationally and that hierarchical levers can be ineffective as driving change across the wider system.[297] Within our experience of rapid implementation of virtual clinics, delegating the power and cognitive authority to a range of professionals across the RNOH was key to the success of the project.

Work to redesign non admitted pathways and consideration of how VC can be utilised effectively throughout both surgical and non-surgical pathways must be undertaken. The positives associated with VC need to be fully understood and built upon. For example, at the RNOH, many patients travel from across the country to utilise specialist services making VC a vital tool to overcome geographical boundaries. Additionally, the RNOH is a largely COVID-secure (green) site, which creates a new incentive to maximise VC. These drivers to change must be communicated to generate enthusiasm, to motivate commitment and inspire others to want to do it,[286] to move towards a vision that is better and fundamentally different from the pre-pandemic norm.[297]

We have identified occasions where it would be advantageous to run group sessions, for example group exercise classes or education classes. Whilst there are many off the shelf applications and many of them lend themselves to group or 1:1 format, there does not appear to be a solution that works for all scenarios. Alternative platforms have been trialled to support the implementation of group sessions within a virtual pain management and rehabilitation programme and we have shared lessons across the organisation to facilitate the spread of quality improvement. It would be beneficial for any virtual clinic platform to be integrated with our other hospital systems whilst being user-friendly and safe. Flexible platforms that can be specifically tailored to suit local needs are needed.

Many VC platforms offered their services for free or under large scale licenses during the pandemic. Work is required to carry out an options appraisal of the platforms available with clinical input to ascertain the medium to long term strategy. This also needs to take into consideration business continuity planning. Careful contract management will be required during these early stages: organisations need to have contingencies in place should the primary platform fail. NHS leaders and technology providers might consider working together to provide collaborative solutions; a coordinated and potentially centralised effort to procure effective solutions might be the most effective way to address both value and reliability concerns.

Financial appraisal of services is complex. Previous attempts to establish virtual clinics have failed due to non F2F appointments receiving lower payments. The tariff for VC is currently the same as for F2F, providing equal financial incentive (or disincentive) for either modality. Anecdotally, assumptions are made about VC being ‘cheaper’ than F2F clinics. The operation of F2F and VC in an outpatient setting requires similar staffing levels; clinics continue to operate for the same amount of allotted time and there continues to be a requirement for additional support services. As highlighted in our early implementation, patients often require additional levels of support when using VC compared to traditional clinics. If the required resources to implement change is judged greater than the gains, it is unlikely VC will be incorporated as part of routine practice. If, for example, resources diminish through reduction of non F2F tariffs post COVID-19, hospitals will be financially disincentivised to continue to offer VC. Any amendments to contracts should be made after a thorough and robust economic evaluation to ensure tariffs are appropriate and commensurate with services being offered.

Some patients struggled with getting the technology to work. For example, the platform requires a specific browser and it some patients did not understand the difference between browsers. Many patients had to be talked through the process of updating phone or tablet software – again, there were some who did not understand this. RNOH staff involved in the early implementation were able to contact patients who were missing at the allotted time and provide one-to-one troubleshooting advice. Were this not available, a significant proportion of patients would have missed out on their clinical appointment. Innovations such a single NHS Patient Helpdesk with opportunity for ‘trial runs’ would ensure equity across the NHS. The use of VC changed what was required of patients and this could potentially be burdensome.[98] Some patients chose phone calls rather than video appointments because they did not have access to the required technology. We need an improved understanding of the barriers to access.

Patients who required support with communication (e.g. via an interpreter) may be excessively disadvantaged from forced use of VC during COVID. Virtual clinics represent a good opportunity for translation services to change their ways of working to become more agile (e.g. benefit from homeworking). In addition, family members or friends, *where appropriate*, can be brought into VCs and can help with translation and greater understanding. Clinics with an interpreter present may be limited as patients don't have access to the interpreter to clarify understanding after a consultation is over whereas with family members/friends, patients have continued access to ask questions and allay anxiety. VC may lead to safeguarding issues through not being able to know, or control who was present at a consultation and it is important to ensure safeguarding policies at institutions consider issues arising from the use of VC.[199]

Thorough evaluation of the effectiveness and safety of virtual management of patients is required to guide ongoing implementation moving forwards. Our work on rapid implementation found that, of the patients who underwent a video call, 44% of these would opt for a video for their next appointment.[31] This figure may be influenced by the COVID-19 pandemic. Design of future pathways must incorporate a thorough investigation of patient preferences. Underlying reasons behind why patients *do not* prefer VC can then be addressed to support better engagement from patients in the future. In addition, a key understanding into the issues and barriers faced by clinicians will influence the optimal use of VC for clinical care. This is essential as we continue to manage patients beyond COVID-19.

Our vision for the RNOH is of continuous improvement as the UK’s leading specialist orthopaedic hospital, enhancing our international profile for outstanding patient care. As such, our outcomes matter to us. It is essential that we evaluate our clinical outcomes and continue to operate with patient experience at the centre of our evaluation. Robust evaluation is needed to underpin our future pathway development.

B.4 Summary of Leadership Lessons

There have been unprecedented levels of change across the NHS during the pandemic response. Many have questioned how this amount of change was possible given previous challenges in delivering and sustaining transformation.[298] The leaders at the RNOH have reflected on learning from this rapid roll-out to identify key areas of focus for delivering successful change projects in future.

Being able to clearly articulate a vision was, on reflection, a key enabler in this project. Against the backdrop of the existing vision to be the world's leading neuromusculoskeletal hospital, the leadership team set a vision of delivering 80% virtual clinics. This was specific and ambitious. The message was clear, succinct and communicated to all members of staff at the earliest possible time point. Although the implementation team were not involved with setting the virtual roll-out vision, they were able to bring their knowledge and skills to it to provide leadership for the change process.

Identification and allocation of appropriate resources to the project was a critical success factor in the roll-out. Under normal circumstances resource allocation is challenging as there are always competing priorities. This was heightened during the pandemic response with redeployment of staff to different roles across the Trust and the healthcare system. At the RNOH a small proportion of staff have dedicated time for involvement in research and improvement initiatives as a core job role. It was essential to have staff with the skills and the time to support this project during its implementation. Additional resources were mobilised by reallocating staff members to the project. Some staff members were flexibly assigned – they contributed and withdrew as was needed. Many of the staff who were not part of the core team contributed to the work of embedding virtual clinics in practice because improvement is part of the daily job. Without these resources, it is unlikely that the data capture, analysis and project learning[31] would have happened and likely that the implementation would have been less rapid.

There are different change models and project management tools to guide service improvement; in common with much of the NHS, the RNOH uses the IHI QI framework. Committing to using one framework ensured those involved in the project had a clear approach and a common language for discussing change. The large scale change model[297] provides a complementary route into thinking about some of these issues. The RNOH senior leaders have all received training on quality improvement methodology and a roll out to all staff commenced in 2019 ensuring enhanced organisational capability to deliver change. Using a formal common change approach helps reassure senior leaders in the organisation that change is managed through testing and reflection, which in turn makes it easier to devolve decision making and facilitate a shift in power and a more distributed leadership, which is essential for large scale change.[297] The methodology enabled successful initial implementation and facilitated rapid learning across the organization and beyond.

There was not enough time to undertake a full training needs analysis of staff or patients prior to the implementation of virtual clinics. It was therefore decided by the team that technology-aware support staff would be deployed to each clinic across the organisation. Establishing a log of skills was helpful to direct the real-time development of resources. These resources were updated and shared daily if required. Where clinicians were finding virtual clinics challenging, staff were deployed to support them throughout the clinic as required. Staff who required ongoing support were provided with a named contact who worked with them until they achieved confidence and competence.

Patients were provided with less than a week's notice of the conversion from a F2F to a virtual consultation. Some patients, who did not feel confident with a video call, opted for a phone call. Some patients who lacked confidence opted for a video call with technical support. An unfamiliar consultation format may not be desirable for all patients. Our previous research found that offering a trial run, where patients are given the opportunity to test the technology, would enhance its acceptability and its potential uptake.[49] Providing test clinics would provide patients with the opportunity to learn how to use the technology without interfering with the clinical encounter. Whilst the implementation of virtual clinics was successful, further work is required to understand the impact on the quality of care patients received. Domains of quality such as safety, effectiveness and patient experience[299] should be considered in future evaluations of virtual consultations. Future service design needs to be undertaken following thorough engagement with patients as we look to redesign pathways for the future.

B.5 Conclusions

COVID-19 forced a change in the way we delivered care to our patients at the RNOH. VC was rapidly deployed across the Trust to continue delivering care whilst avoiding transmission of the virus through unnecessary hospital visits. This paper provides a reflective account and commentary on leadership lessons learnt from the experience of deploying virtual clinics.

Having an existing strategy that targeted VC roll-out meant that some enablement works had been completed. This was further supported by an agreed improvement framework and an empowered implementation team with permission, time and space. The effective communication and decision-making pathways and flexibility of clinical and non-clinical staff all worked well. Capacity of the chosen platform, patient connectivity and ability to access and utilise the technology were challenges to successful delivery. In the future, attention needs to be focused on sustaining these new ways of working and routinising appropriate use of virtual consultations. Consideration must also go to selecting a platform that is stable, fulfils the complex requirements of a multitude of clinical areas and is integrated with Trust systems. Business continuity planning must take place to ensure viable alternatives and the economics of VC must be fully understood in the context of commissioned services. Provision must consider the barriers that patients face when accessing care, patient preferences and the suitability of technology to achieve high quality clinical outcomes.

B.5.1 Contributorship Statement

AWG and JB designed the work. AWG, LD, JD, SP, LM, DJ, JCTB and JB were involved in collection, analysis and interpretation of data. AWG drafted the work. All authors critically revised the draft, gave final approval of the version to be published and are accountable for all aspects of the work.

B.5.2 Acknowledgements

The authors wish to acknowledge several groups of people from the Royal National Orthopaedic Hospital: the patients and clinicians who participated in the virtual clinics, the information technology team for their support with the hardware and software, the information governance team for their expertise on data protection and privacy impact, the Research and Innovation Centre for prompt review and registration of the project and the administration staff for contacting patient.,. The authors are particularly grateful to the COVID-19 Action Group (Ruth Adam, Rebecca Tobin, Shiv Bagdai, Noreen Galvin, Ian Farr and Adam Allain) for their support with the overall delivery of the project.

Appendix C The PRISMA Protocol (Prisma P)

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes and study design (PICOS).	5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address) and, if available, provide registration information including registration number.	4
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Supplementary material 1

Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review and, if applicable, included in the meta-analysis).	4
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level) and how this information is to be used in any data synthesis.	4 & 9
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	9
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	9

Appendix D The CONNECT Project Phase 1 Search Strategy

D.1 Searches

English Language studies will be searched for with no date restrictions. The following databases will be searched using a combination of keywords and database specific subject headings: MEDLINE, AMED, CINAHL, PsycINFO and Scopus. Forward and backwards reference screening of identified papers and relevant systematic reviews will be completed using Web of Science.

D.2 Types of study to be included

Qualitative studies or studies with a qualitative component (use of interviews or focus groups)

D.3 Condition or domain being studied

Orthopaedics and musculoskeletal pathologies

D.4 Participants/population

D.4.1 Inclusion:

- Full text academic papers.

- Patients with an orthopaedic / musculosketal problem

- Studies reporting patients accessing clinical care (assessment / rehabilitation) through the use of real time communication technology (eg telephone, videoconferencing) in an orthopaedic / musculoskeletal setting.

- Qualitative studies or studies with a qualitative component (use of interviews or focus groups)

D.4.2 Exclusion:

- Conference abstracts

- Participants without an orthopaedic / musculoskeletal complaint

- Quantitative studies

- Studies not reporting patient viewpoints

D.5 Intervention(s), exposure(s) Inclusion:

Participants accessing clinical care (assessment / rehabilitation) through the use of communication technology in real time (eg telephone, videoconferencing) in an orthopaedic / musculoskeletal setting.

D.6 Comparator(s)/control

N/A

D.7 Context

Studies will be included providing they report the perspectives of patients regarding access to musculoskeletal / orthopaedic assessment / rehabilitation. Studies may also contain perspectives of clinicians in addition to the viewpoints of patients.

D.8 Main outcome(s)

Patient experience and workload of using communication technology to access musculoskeletal / orthopaedic assessment / rehabilitation.

D.9 Timing and effect measures

Not applicable.

D.10 Additional outcome(s)

None

D.11 Timing and effect measures

None

D.12 Data extraction (selection and coding)

Two researchers will independently identify full text papers meeting the inclusion criteria. Discrepancies arising regarding selection will be resolved through discussion with a third researcher.

D.13 Risk of bias (quality) assessment

Two researchers will independently screen the full text included studies for risk of bias. The Critical Appraisal Skills Programme Qualitative Tool will be used. Discrepancies arising regarding risk of bias will be resolved through discussion with a third researcher.

D.14 Strategy for data synthesis

All studies included for full text review will be analysed. Data extracted from the Methods, Results, Discussion and Conclusion sections will be analysed by using an attribution analysis. A taxonomy of attributions will be thematically analysed using NVIVO software in accordance with Normalisation Process Theory.

D.15 Search Terms

Database	**Search Term**
MEDLINE	(communication technology OR e-health OR telecare OR telemedicine OR telehealth OR telemonitoring OR videoconferencing OR real time videoconferencing OR real time 1:1 videoconferencing OR telecommunication OR virtual OR (MH "telemedicine") OR (MH "remote consultation") OR (MH "videoconferencing")) AND (Focus group OR Focus groups OR observation OR Ethnography OR Ethnographic OR Phenomenology OR Phenomenological OR Lived experience OR Grounded theory OR Thematic analysis OR Conversation analysis OR Framework analysis OR (MH "Qualitative Research")) AND (physio OR physiotherapy OR physical therapy OR rehab OR rehabilitation)
AMED	(communication technology OR e-health OR telecare OR telemedicine OR telehealth OR telemonitoring OR videoconferencing OR real time videoconferencing OR real time 1:1 videoconferencing OR telecommunication

	OR virtual OR (SU (telemedicine) OR (SU (technology medical))) AND (Focus group OR Focus groups OR observation OR Ethnography OR Ethnographic OR Phenomenology OR Phenomenological OR Lived experience OR Grounded theory OR Thematic analysis OR Conversation analysis OR Framework analysis) AND (physio OR physiotherapy OR physical therapy OR rehab OR rehabilitation)
CINAHL	(communication technology OR e-health OR telecare OR telemedicine OR telehealth OR telemonitoring OR videoconferencing OR real time videoconferencing OR real time 1:1 videoconferencing OR telecommunication OR virtual OR (MH “Videoconferencing”) OR (MH “Remote Consultation”)) AND (Focus group OR Focus groups OR observation OR Ethnography OR Ethnographic OR Phenomenology OR Phenomenological OR Lived experience OR Grounded theory OR Thematic analysis OR Conversation analysis OR Framework analysis OR (MH “qualitative studies”)) AND (physio OR physiotherapy OR physical therapy OR rehab OR rehabilitation)
PsychINFO	(communication technology OR e-health OR telecare OR telemedicine OR telehealth OR telemonitoring OR videoconferencing OR real time videoconferencing OR real time 1:1 videoconferencing OR telecommunication OR virtual OR (DE "Telemedicine")) AND (Focus group OR Focus groups OR observation OR Ethnography OR Ethnographic OR Phenomenology OR Phenomenological OR Lived experience OR Grounded theory OR Thematic analysis OR Conversation analysis OR Framework analysis OR DE "Qualitative Research")) AND (physio OR physiotherapy OR physical therapy OR rehab OR rehabilitation)
SCOPUS	1. (TITLE-ABS-KEY (“communication technology” OR ehealth OR telecare OR telemedicine OR telehealth OR telemonitoring OR videoconferencing OR “real time videoconferencing” OR “real time 1:1 videoconferencing” OR telecommunication OR virtual)) 2. (TITLE-ABS-KEY (“Focus group” OR “Focus groups” OR observation OR Ethnography OR Ethnographic OR Phenomenology OR Phenomenological OR “Lived experience” OR “Grounded theory” OR “Thematic analysis” OR “Conversation analysis” OR “Framework analysis”))

	3. (TITLE-ABS-KEY (physio OR physiotherapy OR physical therapy OR rehab OR rehabilitation) 4. #1 AND #2 AND #3

Appendix E Standards for Reporting Qualitative Research – Protocol Paper

Item	**Page**
Item 1. Title: Concise description of the nature and topic of the study. Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended.	1, 7
Item 2. Abstract: Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions.	2,7
Item 3. Problem Formulation: Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement.	4,5
Item 4. Purpose or research question: Purpose of the study and specific objectives or questions.	7
Item 5. Qualitative approach and research paradigm: Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., post-positivist, constructivist/interpretivist) is also recommended; rationale	5,7
Item 6. Researcher characteristics and reflexivity: Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and/or transferability.	8
Item 7. Context: Setting/site and salient contextual factors; rationale.	7
Item 8. Sampling strategy: How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale.	7

Item 9. Ethical issues pertaining to human subjects: Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues.	7
Item 10. Data collection methods: Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods and modification of procedures in response to evolving study findings; rationale.	8
Item 11. Data collection instruments and technologies: Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study.	supp
Item 12. Units of study: Number and relevant characteristics of participants, documents, or events included in the study; level of participation.	7
Item 13. Data processing: Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding and anonymisation / de-identification of excerpts.	8
Item 14. Data analysis: Process by which inferences, themes, etc. were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale.	8
Item 15. Techniques to enhance trustworthiness: Techniques to enhance trustworthiness and credibility of data analysis,(e.g., member checking, triangulation, audit trail); rationale	8
Item 16. Synthesis and interpretation: Main findings (e.g., interpretations, inferences and themes); might include development of a theory or model, or integration with prior research or theory.	n/a
Item 17. Links to empirical data: Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings.	n/a
Item 18. Integration with prior work, implications, transferability and contribution(s) to the field: Short summary of main findings, explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of	n/a

application/generalisability; identification of unique contribution(s) to scholarship in a discipline or field.	
Item 19. Limitations: Trustworthiness and limitations of findings	n/a
Item 20. Conflicts of interest: Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed.	n/a
Item 21. Funding: Sources of funding and other support; role of funders in data collection, interpretation and reporting.	11

Appendix E

Appendix F Phase 2 Patient Interview Schedule

Part 1 – Burden of Treatment

- **Impact on Patient:** how technology consultations influence the experience of living with illness and engagement with clinical care

What was life like before you got your condition?

How does your condition affect you with daily life?
- Family
- Friends
- Work
- Hobbies
- Day to day activities and routine

Does anyone support you to manage your condition?

How do you manage your condition?
- Routine stuff
- Managing exacerbations

What medical services do you interact with, what for?
- Regulararity?

How would using communication technology impact on how you manage your condition?

Part 2 – Results of Phase 1

- **Skills:** what were needed, how were they gained, how were they enacted in practice.

What skills do you think you would need in order to use Communication technology for your [physio / OT]? (Is there any difference between the two?)

Do you have the skills now? How would you get them? How could the RNOH support you to get them?

Describe how you think communication technology use would look in reality

- **Clinical Interactions:** impact of technology consultations on clinical interactions

What is the relationship like with you and your clinician now? Would it be different using communication technology? What could you still do? What couldn't you do? How would this make you feel?

How would it be with someone different? What would be 'a good person'. What would be a 'bad person'.

- **Environment:** the location and resources required to engage with clinical rehabilitation

What would you physically need to use communication technology? Where would you get it from? Where would you like to get it from (ie self-sourced or hospital sourced)

Where would you use it from? What space would you need to achieve the objectives of the consulation?

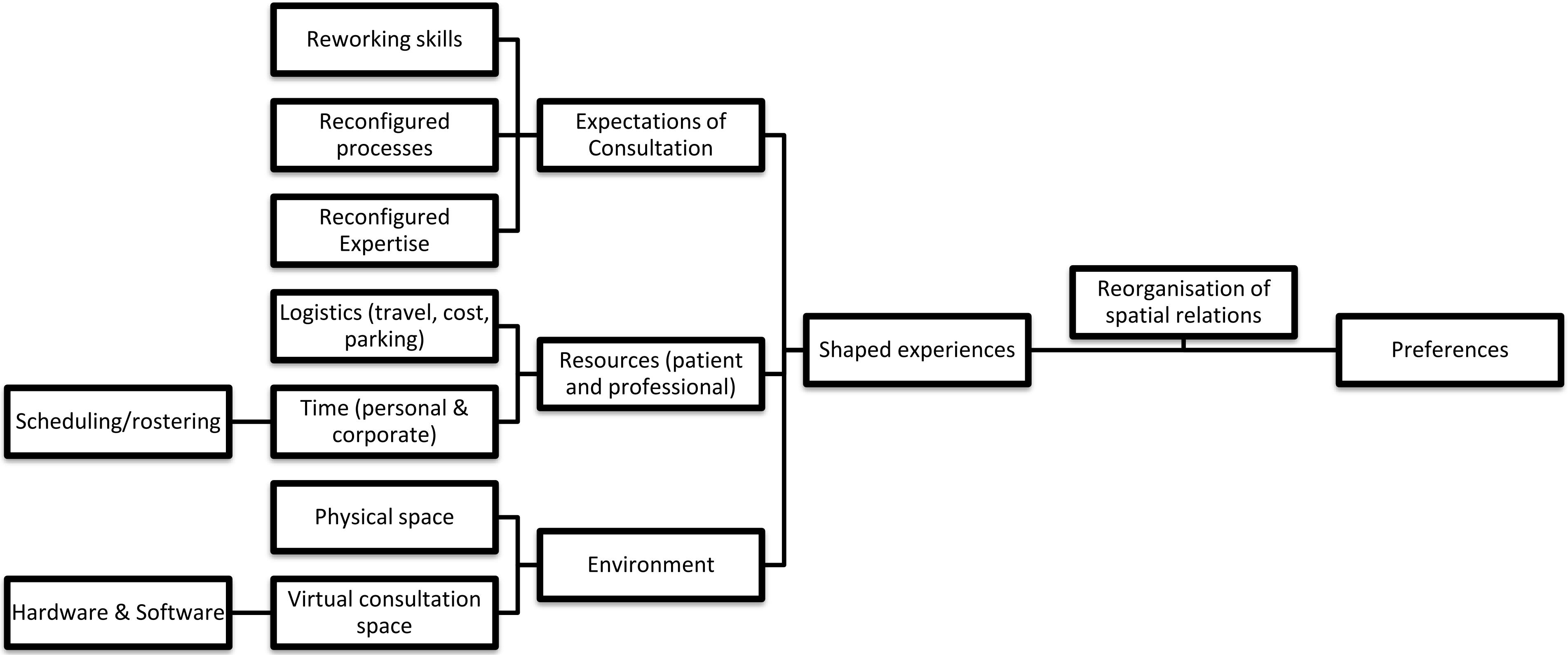
- **Processes:** how technology consultations affect routine clinical practice

What has your journey been as an RNOH patient

(previous care, how they got referred, waiting time, experience of being a patient, dealing with other services?)

How would this change with using communication technology? Wat would be better? What would be worse?

Appendix F


Reworking skills
Reconfigured processes
Reconfigured Expertise
Expectations of Consultation
Logistics (travel, cost, parking)
Time (personal & corporate)
Scheduling/rostering
Resources (patient and professional)
Physical space
Virtual consultation space
Hardware & Software
Environment
Shaped experiences
Reorganisation of spatial relations
Preferences

Part 3 – DCE Design

- **Preferences:** the potential patients see for technology as an alternative to routine face-to-face care

In what situations would you be happy to use technology?

In what situations would you not be happy to use?

What would use look like for you at the RNOH?

What would we need to consider? From a personal perspective? From others' perspective?

Anything you would like to add that might help the research?

Appendix F

Appendix G Phase 2 Clinician Interview Schedule

CONNECT Project Topic Guide

Part 1 – Burden of Treatment

- **Impact on Patient:** how technology consultations influence the experience of living with illness and engagement with clinical care

Can you give me examples of how patients' conditions affect their life? eg
- Family
- Friends
- Work
- Hobbies
- Day to day activities and routine

Do your patients need support to manage their condition?

How do patients manage their condition?
- Routine stuff
- Managing exacerbations

What medical services do your patients interact with, what for?
- Regulararity?

How would using communication technology impact on how patients manage their conditions?

Part 2 – Results of Phase 1

- **Skills:** what were needed, how were they gained, how were they enacted in practice.

What skills do you think patients would need in order to use Communication technology for your [physio / OT]? (Is there any difference between the two?)

Do your patients have the skills now? How would they get them? How could the RNOH support them to get them?

Describe how you think communication technology use would look in reality

- **Clinical Interactions:** impact of technology consultations on clinical interactions

Would it be different using communication technology? What could you still do? What couldn't you do? How would this make your patients feel?

How would it be with someone different? What would be 'a good person'. What would be a 'bad person'.

- **Environment:** the location and resources required to engage with clinical rehabilitation

What would you physically need to use communication technology? Where would patients get it from? Where would they like to get it from (ie self-sourced or hospital sourced)

Where would they use it from? What space would they need to achieve the objectives of the consultation?

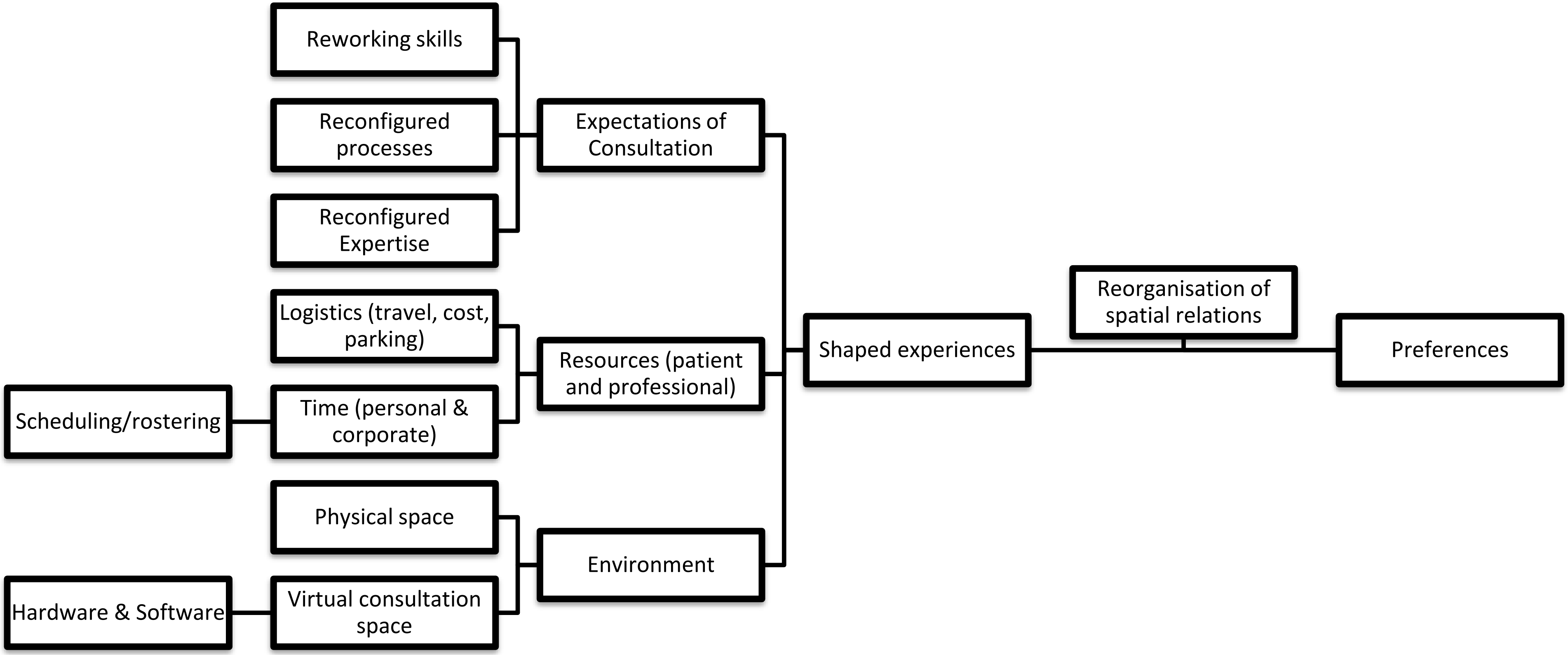
- **Processes:** how technology consultations affect routine clinical practice

Think of your patients pathway….

(previous care, how they got referred, waiting time, experience of being a patient, dealing with other services?)

How would this change with using communication technology? What would be better? What would be worse?

Appendix G


Reworking skills
Reconfigured processes
Reconfigured Expertise
Expectations of Consultation
Logistics (travel, cost, parking)
Scheduling/rostering
Time (personal & corporate)
Resources (patient and professional)
Physical space
Hardware & Software
Virtual consultation space
Environment
Shaped experiences
Reorganisation of spatial relations
Preferences

Part 3 – DCE Design

- **Preferences:** the potential patients see for technology as an alternative to routine face-to-face care

In what situations would patiens be happy to use technology?

In what situations would patients not be happy to use?

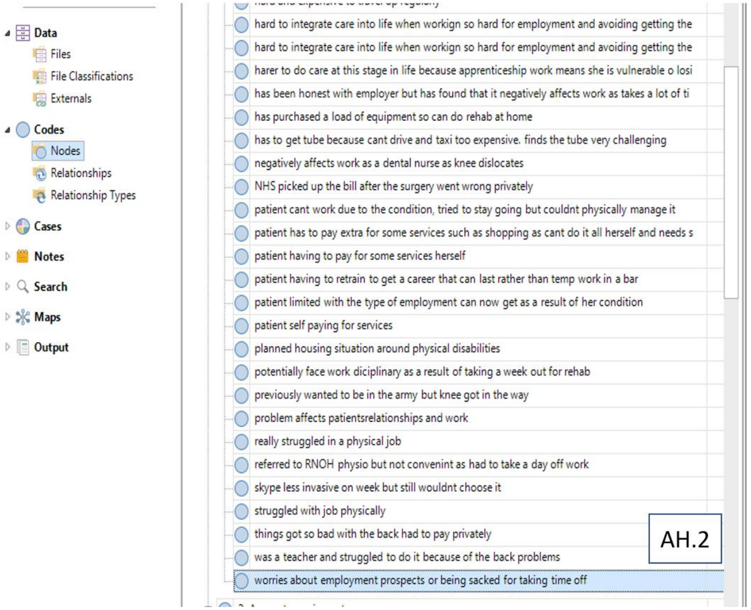
What would use look like for you at the RNOH?

What would we need to consider? From a personal perspective? From others' perspective?

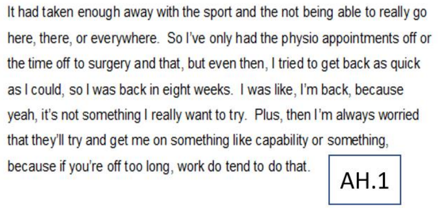
Anything you would like to add that might help the research?

Appendix H Illustration of Data Analysis - Phase 2

Within this appendix, I illustrate the key steps taken during the data analysis within Phase 2. Label (AH.1) in Figure 19 below demonstrates the context from the text and the key part of the transcript for coding **'Plus, then I'm always worried that they'll try and get me on something like capability or something, because if you're off too long, work do tend to do that.'** During open coding, a description of the content was provided (Label AH.2): '**worries about employment prospects or being sacked for taking time off.**'



- hard to integrate care into life when workign so hard for employment and avoiding getting the
- hard to integrate care into life when workign so hard for employment and avoiding getting the
- harer to do care at this stage in life because apprenticeship work means she is vulnerable o losi
- has been honest with employer but has found that it negatively affects work as takes a lot of ti
- has purchased a load of equipment so can do rehab at home
- has to get tube because cant drive and taxi too expensive. finds the tube very challenging
- negatively affects work as a dental nurse as knee dislocates
- NHS picked up the bill after the surgery went wrong privately
- patient cant work due to the condition, tried to stay going but couldnt physically manage it
- patient has to pay extra for some services such as shopping as cant do it all herself and needs s
- patient having to pay for some services herself
- patient having to retrain to get a career that can last rather than temp work in a bar
- patient limited with the type of employment can now get as a result of her condition
- patient self paying for services
- planned housing situation around physical disabilities
- potentially face work diciplinary as a result of taking a week out for rehab
- previously wanted to be in the army but knee got in the way
- problem affects patientsrelationships and work
- really struggled in a physical job
- referred to RNOH physio but not convenint as had to take a day off work
- skype less invasive on week but still wouldnt choose it
- struggled with job physically
- things got so bad with the back had to pay privately
- was a teacher and struggled to do it because of the back problems
- worries about employment prospects or being sacked for taking time off

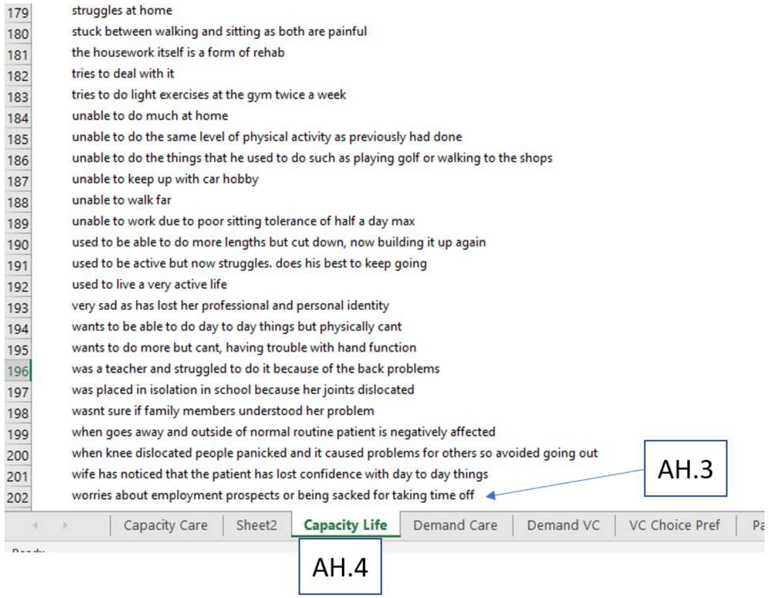


It had taken enough away with the sport and the not being able to really go here, there, or everywhere. So I've only had the physio appointments off or the time off to surgery and that, but even then, I tried to get back as quick as I could, so I was back in eight weeks. I was like, I'm back, because yeah, it's not something I really want to try. Plus, then I'm always worried that they'll try and get me on something like capability or something, because if you're off too long, work do tend to do that.

Appendix H

Figure 19 Demonstration of open coding

The NVIVO nodes were imported into Microsoft Excel. This decision was made for 2 reasons: 1) because the NVIVO file kept crashing 2) Excel was an easier way to share the list of nodes without requiring an NVIVO license. Figure 20 demonstrates a list of NVIVO nodes (AH.3) that were grouped into the theme of ‘Capacity’ with a focus on the patients life (AH.4).



179	struggles at home
180	stuck between walking and sitting as both are painful
181	the housework itself is a form of rehab
182	tries to deal with it
183	tries to do light exercises at the gym twice a week
184	unable to do much at home
185	unable to do the same level of physical activity as previously had done
186	unable to do the things that he used to do such as playing golf or walking to the shops
187	unable to keep up with car hobby
188	unable to walk far
189	unable to work due to poor sitting tolerance of half a day max
190	used to be able to do more lengths but cut down, now building it up again
191	used to be active but now struggles. does his best to keep going
192	used to live a very active life
193	very sad as has lost her professional and personal identity
194	wants to be able to do day to day things but physically cant
195	wants to do more but cant, having trouble with hand function
196	was a teacher and struggled to do it because of the back problems
197	was placed in isolation in school because her joints dislocated
198	wasnt sure if family members understood her problem
199	when goes away and outside of normal routine patient is negatively affected
200	when knee dislocated people panicked and it caused problems for others so avoided going out
201	wife has noticed that the patient has lost confidence with day to day things
202	worries about employment prospects or being sacked for taking time off

Figure 20 Taxonomy of NVIVO nodes in Excel

Appendix H

The NVIVO nodes were then mapped out on A3 paper to aid sense-making. Figure 21 offers a ‘clean’ version of the node groupings prepared within MS PowerPoint for presentation purposes.

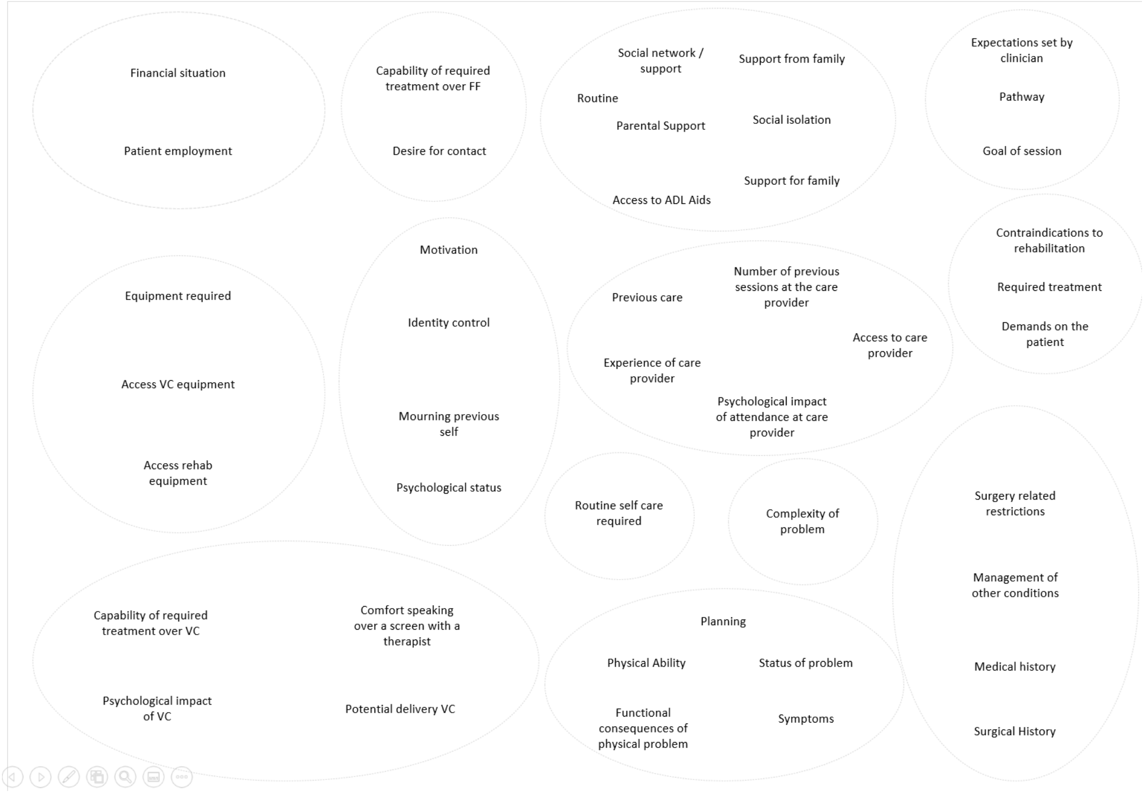
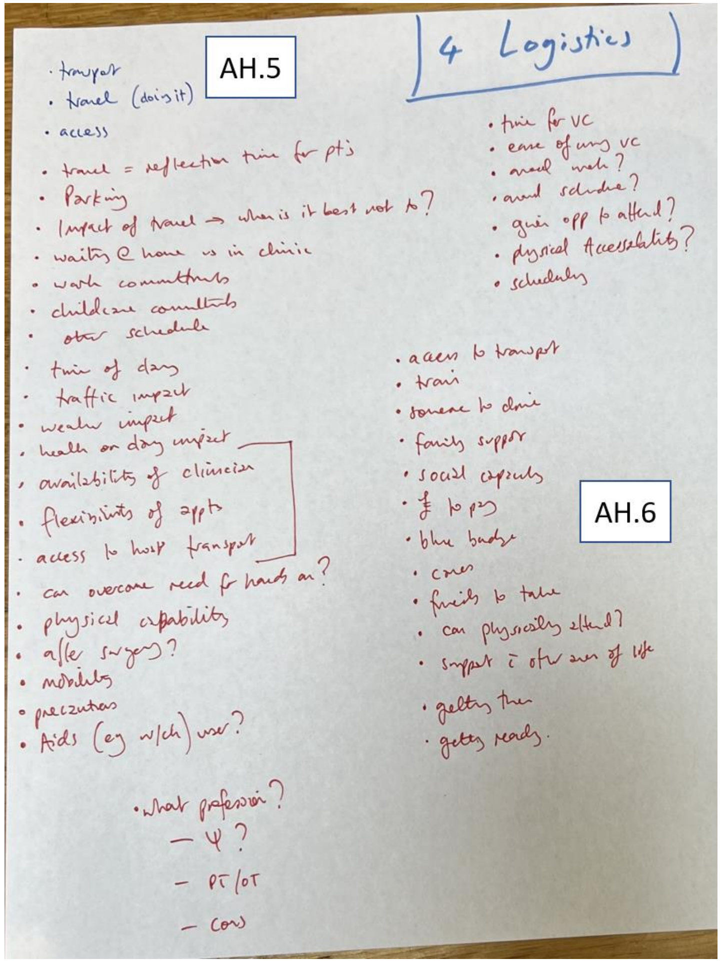


Figure 21 ‘Clean’ version of A3 map of node groupings

Appendix H

Data that matched the results of the CONNECT Project Phase I were temporarily set aside; this research sought abductive ‘surprises’ (new themes) in additions to those gained from our previous work. In Figure X and Figure Y the label AH.5 demonstrates the previously identified data from the ‘Logistics’ theme in Phase 1 (blue text). In Figure 22 and Figure 23 the label AH.6 demonstrates new ‘abductive surprises’ from Phase 2.

Figure 22 ‘Messy’ map of *Logistics* theme from Phase 1



4 Logistics

AH.5

- transport
- travel (doing it)
- access
- travel = reflection time for pts
- Parking
- Impact of travel → when is it best not to?
- waiting @ home vs in clinic
- work commitments
- childcare commitments
- other schedule
- time of day
- traffic impact
- weather impact
- health on day impact
- availability of clinician
- flexibility of appts
- access to hosp transport
- can overcome need for hands on?
- physical capability
- after surgery?
- mobility
- precautions
- Aids (eg w/ch) use?

- what profession?
  - Ψ ?
  - PT/OT
  - cons

- time for VC
- ease of using VC
- avoid work?
- avoid schedule?
- given opp to attend?
- physical Accessibility?
- scheduling

- access to transport
- train
- someone to drive
- family support
- social capacity
- £ to pay
- blue badge
- carers
- friends to take
- can physically attend?
- support c̄ other areas of life
- getting there
- getting ready.

AH.6

Figure 23 ‘Clean’ map of *Logistics* theme from Phase 1

Appendix H

Within each theme, the sub components were mapped on A3 paper to stimulate thinking about patient preferences. Figure 24 below demonstrates a map of capacity. The arrows indicate a relationship between the sub themes within capacity. For example, the arrow below label AH.7 indicates the relationship between the medical and physical patient diagnosis and the capacity that is required through their social networks, such as family and support. Label AH.8 rests on the arrow between delivery of care (what is required) and the home environment and its suitability for VC.

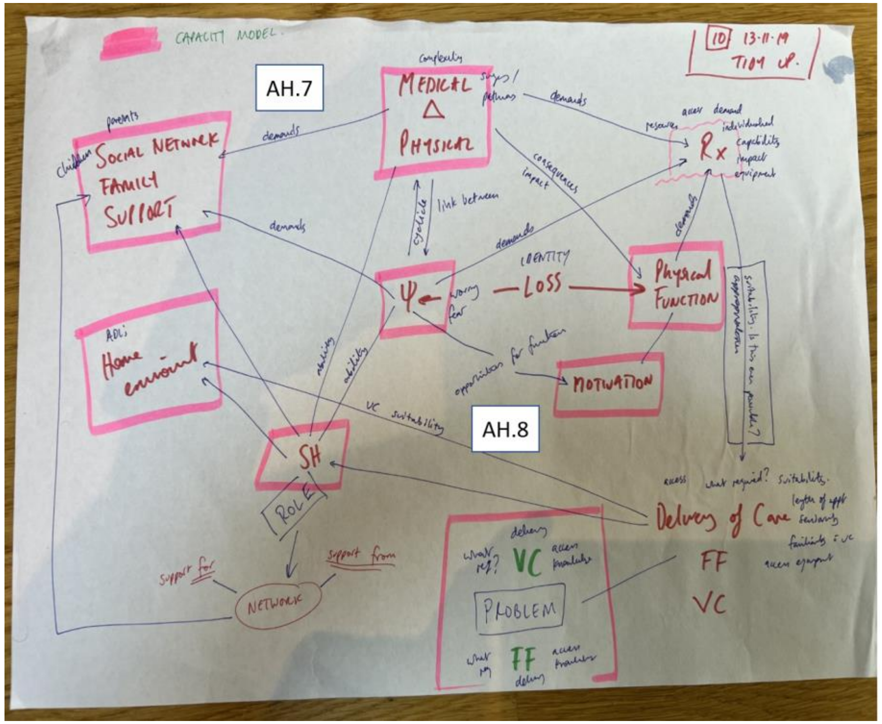


Figure 24 Mapping capacity

The final model for this phase is shown within Figure 25. (a) is the relationship between *Situation of care* and *Expectations of care,* (b) is the relationship between *Situation of care* and *Demands of care*, (c) is the relationship between *Situation of care* and *Capacity to allocate resources to care*, (d) is the consequences of *Preference* and (e) is the formation of *Preference*. The arrows flow in both directions to indicate a transformative relationship.

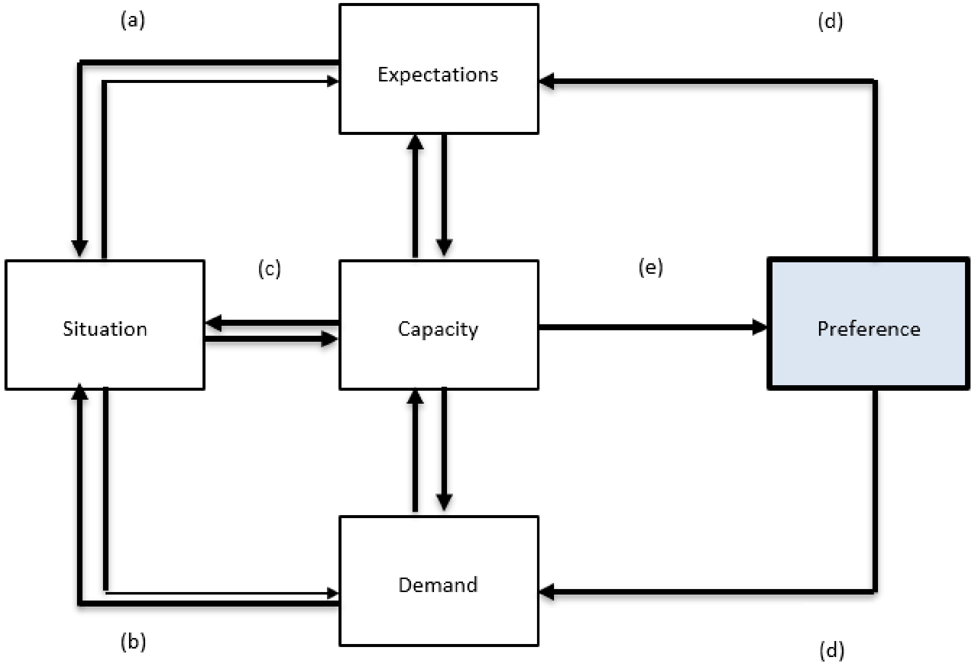


Figure 25 Copy of Final model Phase 2

Appendix H

Appendix I Standards for Reporting Qualitative Research – Phase 2

	Item	**Page**
Title	Item 1. Title: Concise description of the nature and topic of the study. Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended.	page 1
Abstract	Item 2. Abstract: Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions.	page 2
Problem Formulation	Item 3. Problem Formulation: Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement.	page 4
Purpose or research question	Item 4. Purpose or research question: Purpose of the study and specific objectives or questions.	page 4
	Item 5. Qualitative approach and research paradigm: Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., post-positivist, constructivist/interpretivist) is also recommended; rationale	page 4
	Item 6. Researcher characteristics and reflexivity: Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and/or transferability.	page 16

Context	Item 7. Context: Setting/site and salient contextual factors; rationale.	page 4
Sampling strategy	Item 8. Sampling strategy: How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale.	page 4
Ethical issues pertaining to human subjects	Item 9. Ethical issues pertaining to human subjects: Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues.	page 18
	Item 10. Data collection methods: Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods and modification of procedures in response to evolving study findings; rationale.	page 4
Data collection instruments and technologies	Item 11. Data collection instruments and technologies: Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study.	page 4
Units of study	Item 12. Units of study: Number and relevant characteristics of participants, documents, or events included in the study; level of participation.	page 5
Data processing	Item 13. Data processing: Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding and anonymisation / de-identification of excerpts.	pages 4 & 5
Data analysis	Item 14. Data analysis: Process by which inferences, themes, etc. were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale.	pages 4 & 5

Techniques to enhance trustworthiness	Item 15. Techniques to enhance trustworthiness: Techniques to enhance trustworthiness and credibility of data analysis,(e.g., member checking, triangulation, audit trail); rationale	page 4
Synthesis and interpretation	Item 16. Synthesis and interpretation: Main findings (e.g., interpretations, inferences and themes); might include development of a theory or model, or integration with prior research or theory.	pages 5 - 17
Links to empirical data	Item 17. Links to empirical data: Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings.	pages 7,9,11,13
	Item 18. Integration with prior work, implications, transferability and contribution(s) to the field: Short summary of main findings, explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalisability; identification of unique contribution(s) to scholarship in a discipline or field.	page 17
Limitations	Item 19. Limitations: Trustworthiness and limitations of findings	pages 16 & 17
Conflicts of interest	Item 20. Conflicts of interest: Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed.	page 18
Funding	Item 21. Funding: Sources of funding and other support; role of funders in data collection, interpretation and reporting.	page 18

Appendix J Block 1 DCE Questionnaire

Discrete Choice Experiment v2 Block 1

Preferences for virtual or face-to-face rehabilitation appointments

Thank you very much for taking the time to fill out this questionnaire. It should take no more than 10 minutes to complete.

Firstly there will be eight different scenarios. In each scenario you can choose either to travel to hospital for a face-to-face appointment, or instead to have a virtual appointment from home via a phone call or video call.

There will then be questions about yourself, your rehabilitation and how you travel to your rehabilitation clinic.

If you need any help please ask the research team member.

Please enter your Study ID number.

Please note, you must be 18 years of age to complete this questionnaire

Study ID number

Part 1 – Choosing a face-to-face appointment or a virtual appointment (Question 1 of 8)

Please choose either a face-to-face appointment or a virtual appointment (having an appointment by phone or video call) if you were offered the choice in each situation.

The next session you are offered would be **with a therapist you have seen before**, it would be in **4 weeks time**, it would last **15 minutes** and would be at **8am**.

○ I would choose a face-to-face appointment

○ I would choose a virtual appointment

Part 1 – Choosing a face-to-face appointment or a virtual appointment (Question 2 of 8)

Please choose either a face-to-face appointment or a virtual appointment (having an appointment by phone or video call) if you were offered the choice in each situation.

The next session you are offered would be **with a therapist you have seen before**, it would be in **4 weeks time**, it would last **60 minutes** and would be at **6pm**.

○ I would choose a face-to-face appointment

○ I would choose a virtual appointment

Part 1 – Choosing a face-to-face appointment or a virtual appointment (Question 3 of 8)

Please choose either a face-to-face appointment or a virtual appointment (having an appointment by phone or video call) if you were offered the choice in each situation.

The next session you are offered would be **with a therapist you have seen before**, it would be in **12 weeks time**, it would last **15 minutes** and would be at **12pm**.

○ I would choose a face-to-face appointment

○ I would choose a virtual appointment

Part 1 – Choosing a face-to-face appointment or a virtual appointment (Question 4 of 8)

Please choose either a face-to-face appointment or a virtual appointment (having an appointment by phone or video call) if you were offered the choice in each situation.

The next session you are offered would be **with a therapist you have not seen before**, it would be in **1 week's time**, it would last **15 minutes** and would be at **6pm**.

○ I would choose a face-to-face appointment

○ I would choose a virtual appointment

Part 1 – Choosing a face-to-face appointment or a virtual appointment (Question 5 of 8)

Please choose either a face-to-face appointment or a virtual appointment (having an appointment by phone or video call) if you were offered the choice in each situation.

The next session you are offered would be **with a therapist you have not seen before**, it would be in **1 weeks time**, it would last 30 minutes and would be at 2pm.

○ I would choose a face-to-face appointment

○ I would choose a virtual appointment

Part 1 – Choosing a face-to-face appointment or a virtual appointment (<u>Question 6</u> of 8)

Please choose either a face-to-face appointment or a virtual appointment (having an appointment by phone or video call) if you were offered the choice in each situation.

The next session you are offered would be **with a therapist you <u>have not</u> seen before**, it would be in **1 weeks time**, it would last **60 minutes** and would be at 12pm.

○ I would choose a face-to-face appointment

○ I would choose a virtual appointment

Part 1 – Choosing a face-to-face appointment or a virtual appointment (Question 7 of 8)

Please choose either a face-to-face appointment or a virtual appointment (having an appointment by phone or video call) if you were offered the choice in each situation.

The next session you are offered would be **with a therapist you have not seen before**, it would be in **4 weeks time**, it would last **30 minutes** and would be at **8am**.

○ I would choose a face-to-face appointment

○ I would choose a virtual appointment

Part 1 – Choosing a face-to-face appointment or a virtual appointment (Question 8 of 8)

Please choose either a face-to-face appointment or a virtual appointment (having an appointment by phone or video call) if you were offered the choice in each situation.

The next session you are offered would be **with a therapist you have not seen before**, it would be in **12 weeks time**, it would last **30 minutes** and would be at 2pm.

○ I would choose a face-to-face appointment

○ I would choose a virtual appointment

Part 2 – Demographics

Please tell us about you.

10. What year were you born?

11. What is your self-identified gender?

12. What is your ethnic group

○ Asian / Asian British

○ Black / African / Caribbean / Black British

○ Mixed / Multiple ethnic groups

○ White English / Welsh / Scottish / Northern Irish / Irish / British

○ Any other ethnic group (please specify)

13. What is your main language?

○ English

○ Other (Please Specify)

14. What is your highest level of academic qualifications?

○ No qualifications

○ School level qualifications

○ Professional Qualifications

○ Degree (eg BSc, MSc)

○ Apprenticeship

○ Other (please specify)

Part 3 - About you.

Please tell us some more information about yourself.

15. If you were offered, would you be able to use a phone to make a call to your therapist?

○ Yes

○ No

16. If you are unable to - please tell us why

17. If you were offered, would you be able to make a video call to your therapist?

○ Yes

○ No

18. If you are unable to - please can you give the reason why

19. Do you have access to the equipment and software needed to phone or video-call your therapist

○ Yes

○ No

20. If you answered yes, please let us know the combination of hardware and software you would use

○ I do not have access

○ laptop computer

○ desktop computer

○ tablet computer (eg iPad)

○ mobile phone

○ SKYPE

○ FaceTime

○ Zoom

○ Other (please specify)

21. Would you be willing to download any additional software?

○ Yes

○ No

Please explain your answer if you wish to:

22. In general, are there any other things you need to do that might get in the way of your appointment (tick all that apply)

○ Employment

○ Volunteering

○ Caring for a relative or a friend

○ None whatsoever

○ Other

23. Have you ever not attended or rescheduled a rehabilitation appointment due to any of these reasons?

○ Yes

○ No

If yes, please expand on why if you wish to

Part 4 - Your rehabilitation

Please tell us about the rehabilitation you are coming into the clinic for.

24. Have you had surgery for the problem you are seeking rehabilitation for?

○ Yes - in the last month

○ Yes - in the last three months

○ Yes - in the last 6 months

○ Yes - in the last year

○ Yes - over a year ago

○ No

25. Do you have other conditions that restrict your mobility?

○ Yes

○ No

26. If yes - please state what the conditions are

27. Why are you coming in for rehab at the clinic? (please tick all that apply)

○ Shoulder / arm / hand problem

○ Hip / knee / foot problem

○ Pelvis / back / neck problem

○ Other (please specify)

28. Have you ever received physiotherapy or occupational therapy in the past (before this series of appointments)?

○ Yes

○ No

29. What is the relationship with your current therapist like?

○ Good

○ Poor

○ This is my first session

30. Have you ever not attended or had to reschedule an appointment because of the relationship with your therapist?

○ Yes

○ No

31. What has your rehab consisted of so far? (please tick all that apply)

○ Hands on treatment

○ Exercises

○ Education

○ Using specialist equipment only available to me in the clinic (Please specify)

○ Emotional support

○ Other (Please specify)

Comments

32. What symptoms do you experience with your problem(s)?

○ Pain

○ Fatigue

○ Difficulty with day to day tasks

○ Other (please specify)

33. Have you ever not attended or had to reschedule an appointment because of the symptoms you experience?

○ Yes

○ No

34. How many rehabilitation sessions have you had for your problem?

○ This is the first

○ 2-5

○ 6-9

○ 10 or more

35. If you have had rehabilitation sessions in the past, what frequency have these been?

○ n/a - This is the first

○ Once a week

○ Once a fortnight

○ Once every month

○ Once every 6 weeks

○ Less frequent than the above

Part 5 - Travel to the clinic

Please tell us about your travel arrangements to the clinic.

36. How do you travel to the rehab clinic? (tick all that apply)

○ Your own transport

○ Public transport

○ Hospital transport

○ Other (Please specify)

37. Have you ever not attended or had to reschedule an appointment due to being unable to travel?

○ Yes

○ No

If yes, please can you give us an example?

38. How long does it take you to travel to the rehab clinic?

○ Less than one hour

○ More than one hour

○ More than two hours

○ More than three hours

39. Have you ever not attended or rescheduled an appointment due to the length of time to travel to the rehab clinic?

○ Yes

○ No

40. How much did your RETURN JOURNEY to the rehab clinic (approx)?

£0 (free)	£0.01 -£5	£5.01 - £10	£10.01 - £20	£20.01 - £40	£40.01 - £60	£60.01 – £80	£80.01 - £100	More than £100.01
○	○	○	○	○	○	○	○	○

41. Have you ever missed an appointment because travel is too expensive?

○ Yes

○ No

42. Does someone have to take you to your appointment (eg family member or friend)?

○ Yes

○ No

43. Have you ever not attended or rescheduled an appointment because no one could take you?

○ Yes

○ No

Q44. We would be really interested to understand how you felt before this questionnaire.

○ I felt strongly in favour of a virtual consultation

○ I did not feel strongly either for a virtual consultation or a face-to-face consultation

○ I felt strongly in favour of a face-to-face consultation

Please explain why if you wish:

Questionnaire Complete!

Thank you very much for taking the time to complete this questionnaire.

If you would like us to send results of the study by email or post, please insert your details below

Name____

Email Address

____

or Postal Address

____

____

____

____

Appendix K Full vector of demographic variables for the DCE

Factor	Level	Level	Level	Level	Level	Level	Level
AgeBracket	"EighteentoForty"	"FortyOneToSixty"	"Over60"				
Gender	"F"	"M"	"NB"				
Ethnicity	"Other"	"Asian"	"Black"	"Mixed"	"White"	"Mixed"	
Language	"English"	"NonEnglish"					
Qualification	"NoQual"	"App"	"Degree"	"OtherQual"	"ProfQual"	"SchoolQual"	
MakePhone	"Yes"	"No"					
MakeVideo	"Yes"	"No"					
AccessEquip	"Yes"	"No"					
AddSoftware	"Yes"	"No"					
Commitments	"Yes"	"No"					
DNACommittments	"Yes"	"No"					

RestrictMob	"Yes"	"No"					
UpperQuad	"Yes"	"No"					
LowerQuad	"Yes"	"No"					
Back	"Yes"	"No"					
Other	"Yes"	"No"					
PrevRehab	"Yes"	"No"					
Relationship	"Good"	"First"					
DNARelationship	"Yes"	"No"					
HandsOn	"Yes"	"No"					
Exercises	"Yes"	"No"					
Education	"Yes"	"No"					
SpecialistRehabEquip	"Yes"	"No"					
Pain	"Yes"	"No"					
Fatigue	"Yes"	"No"					
DiffActivities	"Yes"	"No"					
Multiple	"Yes"	"No"					
DNASymptoms	"Yes"	"No"					
NoSessions	"MoreTen"	"TwoFive"	"SixNine"	"First"			

FreqSessions	"NAFirst"	"Weekly"	"Fortnightly"	"Monthly"	"SixWeekly"	"LessThan"	
OwnTransport	"Yes"	"No"					
PublicTransport	"Yes"	"No"					
HospTransport	"Yes"	"No"					
OtherTransport	"Yes"	"No"					
DNATravel	"Yes"	"No"					
TimeTravel	"LessOneHour"	"MoreOneHour"	"MoreTwoHours"	"MoreThreeHours"			
DNATimeTravel	"Yes"	"No"					
TravelCost	"Free"	"UpToFive"	"UpToTen"	"UpToTwenty"	"UpToForty"	"UpToSixty"	"UpToEighty"
DNACostTravel	"Yes"	"No"					
Chaperone	"Yes"	"No"					
DNAChaperone	"Yes"	"No"					
PrefPreDCE	"VC"	"F2F"	"NoPref"				

Appendix L Full DCE Output

Factors and levels *(reference levels within parenthesis)*	**No observations** **(level : reference)**	**Estimate**	**Std. Error**	**z value**	**p value**	**Odds Ratio**	**Retain for model?**
Intercept	N/A	-2.578396	1.376759	-1.873	0.061096 ns	0.07589567	N/A
TherapistNew *(TherapistOld)*	488 : 488	-0.328393	0.200936	-1.634	0.102193 ns	0.72007988	DCE - Yes
When1 Week *(When4 Weeks)*	366 : 305	-0.151006	0.295576	-0.511	0.6094 ns	0.85984286	DCE – Yes
When12 Weeks *(When4 Weeks)*	305 : 305	0.188210	0.321363	0.586	0.558103 ns	1.20708681	DCE – Yes
Duration30 mins *(Duration15 mins)*	305 : 366	-0.982410	0.254102	-3.866	0.000111***	0.37440752	DCE – Yes
Duration60 mins *(Duration15 mins)*	305 : 366	-1.988529	0.253716	-7.838	4.59e-15***	0.13689664	DCE – Yes

TimeOfDay8am *(TimeOfDay12pm)*	244 : 244	1.185406	0.314318	3.771	0.000162***	3.27201450	DCE – Yes
TimeOfDay2pm *(TimeOfDay12pm)*	244 : 244	0.365425	0.313314	1.166	0.243484 ns	1.44112604	DCE – Yes
TimeOfDay6pm *(TimeOfDay12pm)*	244 : 244	1.038028	0.293487	3.537	0.000405***	2.82364325	DCE – Yes
AgeBracketAboveFiftyOne *(AgeBracketUnderFiftyOne)*	552 : 424	0.067237	0.254118	0.265	0.791324 ns	1.06954922	ns - No
GenderF *(GenderM)*	632 : 336	0.074419	0.273121	0.272	0.785256 ns	1.07725793	ns – No
GenderNB *(GenderM)*	8 : 336	2.839061	1.154488	2.459	0.013927 *	17.09970300	Low numbers - No
EthnicityAsian *(EthnicityWhite)*	144 : 696	0.130798	0.293772	0.445	0.656147 ns	1.13973809	ns – No
EthnicityBlack *(EthnicityWhite)*	56 : 696	0.568227	0.565468	1.005	0.314955 ns	1.76513553	ns – No
EthnicityOther *(EthnicityWhite)*	64 : 696	1.811917	0.718086	-2.523	0.011627 *	0.16334064	Low numbers - No
EthnicityMixed *(EthnicityWhite)*	16 : 696	-0.196110	0.878876	-0.223	0.823429 ns	0.82192173	ns – No
LanguageNonEnglish *(LanguageEnglish)*	72 : 904	-0.328792	0.648399	0.648399	0.612097 ns	0.71979297	ns – No

DegreeNoDegree *(DegreeYesDegree)*	248 : 728	0.783941	0.256754	3.053	0.002264 **	2.19008625	Yes
MakePhoneNo *(MakePhoneYes)*	40 : 936	1.041158	0.892293	1.167	0.243277 ns	2.83249400	ns – No
MakeVideoNo *(MakeVideoYes)*	208 : 768	-0.758647	0.559973	-1.355	0.175484 ns	0.46829962	ns – No
AccessEquipNo *(AccessEquipYes)*	160 : 818	-2.349838	0.852159	-2.758	0.005824 **	0.09538459	Yes
AddSoftwareNo *(AddSoftwareYes)*	408 : 568	-0.463210	0.281888	-1.643	0.100334 ns	0.62926074	ns – No
CommitmentsNo *(CommittmentsYes)*	360 : 616	-0.261021	0.264972	-0.985	0.324581 ns	0.77026495	ns – No
SurgeryNo *(SurgeryYes)*	384 : 592	-0.583154	0.297464	-1.960	0.049947 *	0.55813502	ns final model - No
RestrictMobNo *(RestrictMobYes)*	448 : 528	0.009105	0.241102	0.038	0.969877 ns	1.00914619	ns – No
UpperQuadNo *(UpperQuadYes)*	720 : 256	0.989715	0.296073	3.343	0.000829***	2.69046678	Optimise generalisability - No
LowerQuadNo *(LowerQuadYes)*	424 : 552	-0.035476	0.285085	-0.124	0.900967 ns	0.96514593	ns – No
BackNo *(BackYes)*	736 : 240	0.039267	0.287597	0.137	0.891399 ns	1.04004785	ns – No
OtherNo	904 : 72	-0.090756	0.570735	-0.159	0.873656	0.91324050	ns – No

(OtherYes)					ns		
PrevRehabNo *(PrevRehabYes)*	88 : 888	-1.129325	0.513816	-2.198	0.027955 *	0.32325129	Low numbers - No
RelationshipFirst *(RelationshipGood)*	160 : 818	1.059959	0.369085	2.872	0.004081 **	2.88625345	ns final model - No
HandsOnYes *(HandsOnNo)*	616 : 360	0.342114	0.257709	1.328	0.184336 ns	1.40792108	ns – No
ExercisesNo *(ExercisesYes)*	888 : 88	0.298058	0.445235	0.669	0.503215 ns	1.34723949	ns – No
EducationNo *(EducationYes)*	544 : 432	-0.102440	0.257028	-0.399	0.690221 ns	0.90263242	ns – No
SpecialistRehabEquipNo *(SpecialistRehabEquipYes)*	808 : 168	-0.236045	0.290930	-0.811	0.417166 ns	0.78974495	ns – No
EmotionalSupportNo *(EmotionalSupportYes)*	768 : 208	0.383323	0.309143	-1.240	0.214992 ns	0.68159248	ns – No
PainNo *(PainYes)*	56 : 920	-1.823780	0.572359	-3.186	0.001440 **	0.16141439	Low numbers - No
FatigueNo *(FatigueYes)*	456 : 520	-0.220039	0.263041	-0.837	0.402861 ns	0.80248732	ns – No
DiffActivitiesNo *(DiffActivitiesyYes)*	320 : 656	-0.859627	0.275411	-3.121	0.001801 **	0.42331999	Yes
MultipleNo *(MultipleYes)*	184 : 792	-0.680195	0.299950	-2.268	0.023348 *	0.50651840	Yes

^^ NoSessions2AboveFive *(NoSessions2BelowFive)*	432 : 544	0.296951	0.249430	1.191	0.233843 ns	1.34574870	ns – No
^^ FreqSessionsMonthlylessMonthly *(FreqSessionsMonthlyMoreMonthly)*	337 : 639	0.863901	0.265265	3.257	0.001127 **	2.37239831	ns final model - No
OwnTransportNo *(OwnTransportYes)*	304 : 672	0.107604	0.389204	0.276	0.782185 ns	1.11360722	ns – No
PublicTransportNo *(PublicTransportYes)*	792 : 184	-0.068142	0.402950	-0.169	0.865712 ns	0.93412796	ns – No
HospTransportNo *(HospTransportYes)*	824 : 152	0.669653	0.425260	1.575	0.115328 ns	1.95355983	ns – No
OtherTransportNo *(OtherTransportYes)*	880 : 96	0.961201	0.483415	1.988	0.046772 *	2.61483447	Low numbers - No
^^ TimeTravel2OverHour *(TimeTravel2AboveHour)*	424 : 552	-0.070078	0.271285	-0.258	0.796161 ns	0.93232115	ns – No
^^ TravelCost2AboveFive *(TravelCost2BelowFive)*	480 : 496	0.625706	0.252938	2.474	0.013370 *	1.86956585	Yes
ChaperoneNo *(ChaperoneYes)*	552 : 424	0.425351	0.264445	1.608	0.107733 ns	1.53012682	ns - No

^^ = factor collapsed; *** p=<0.001; ** p=<0.01; * p=<0.05; ns = not statistically significant

Appendix L

Appendix M Topic Guide Phase 3b

Part 1 – Results of Phase 3

- Individual responses
- (discuss with participant)
- Impact of COVID on individual responses

Part 2 – Results of Phase 3

- Group responses
- (discuss with participant)
- Impact of COVID on group responses

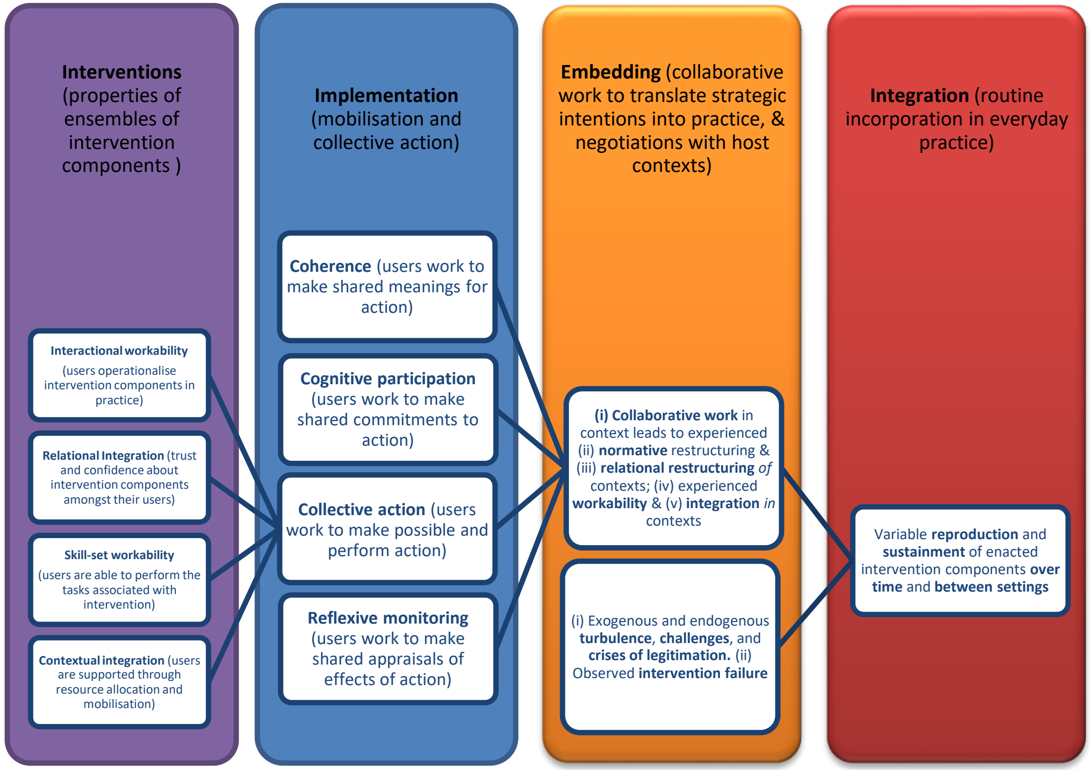
Part 3 – Burden of Treatment

- Impact on Patient: how technology consultations influence the experience of living with illness and engagement with clinical care

Part 4 – Virtual Clinic Design

- Design considerations: what should virtual consultation pathways look like in practice?

Appendix N Interview Schedule Phase 4



Interventions (properties of ensembles of intervention components)

Interactional workability (users operationalise intervention components in practice)

Relational Integration (trust and confidence about intervention components amongst their users)

Skill-set workability (users are able to perform the tasks associated with intervention)

Contextual integration (users are supported through resource allocation and mobilisation)

Implementation (mobilisation and collective action)

Coherence (users work to make shared meanings for action)

Cognitive participation (users work to make shared commitments to action)

Collective action (users work to make possible and perform action)

Reflexive monitoring (users work to make shared appraisals of effects of action)

Embedding (collaborative work to translate strategic intentions into practice, & negotiations with host contexts)

(i) Collaborative work in context leads to experienced (ii) **normative** restructuring & (iii) **relational restructuring** *of* contexts; (iv) experienced **workability** & (v) **integration** *in* contexts

(i) Exogenous and endogenous **turbulence**, **challenges**, and **crises of legitimation.** (ii) Observed **intervention failure**

Integration (routine incorporation in everyday practice)

Variable **reproduction** and **sustainment** of enacted intervention components **over time** and **between settings**

Interview Guide

General Intro

- What were your experiences of VC

Implementation

- Coherence
    - How is VC different from F2F
    - What are the benefits of VC
    - How is it different preparing for VC than F2F
- Cognitive Participation
    - Tell me about how you use VC
    - Do you think VC works for you
- Collective Action
    - Wat do you need to do with a VC to get it set up / use
    - Are you confident with VC – probe
    - What skills do you need to have
    - How were you supported / what support do you need
- Reflexive monitoring
    - Is VC effective
    - How do we need to think about its usefulness, what works for you
    - How was your experience of VC
    - What do we need to change

Embedding

- Potential
    - How does your clinician see VC
    - What things shape whether you can do it or not? What do you need?
- Outcomes
    - How does it change what you need
    - How does it shape relationships
    - What makes it success / fail?
- Context
    - How do you make it fit in with your life?

Integration

- How do you see VC working at this hospital / elsewhere

Preference

- Did VC work for you
- What do you like about it
- What do you like about F2F
- If you were asked to use it again, what would you choose? Why

Appendix N

Appendix O Coding Manual Phase 4

NPT construct and source references		Standard acronym
Coherence	Coherence building that makes interventions and their components meaningful: participants contribute to enacting intervention components by working to make sense of its possibilities within their field of agency. They work to understand how intervention components are different from other practices and they work to make them a coherent proposition for action[50].	CO
	Differentiation: An important element of sense-making work is to understand how interventions and their components and prior practice are different from each other.[68]	CODI
	Communal specification: Sense-making relies on people working together to build a shared understanding of the aims, objectives and expected benefits of interventions and their components.[68]	COCS
	Individual specification: Sense-making has an individual component, too. Here participants in coherence work need to do things that will help them understand their specific tasks and responsibilities around interventions and their components.[68]	COIS
	Internalization: Sense-making involves people in work that is about understanding the value, benefits and importance of interventions and their components.[68]	COIN

Appendix O

Cognitive Participation	Cognitive participation that forms commitment around an intervention and its components: participants contribute to enacting intervention components through work that establishes its legitimacy and that enrols themselves and others into an implementation process. This work frames how participants become members of a specific community of practice.[50]	CP
	Initiation: A core problem is whether or not key participants are working to drive interventions and their components forward.[68]	CPIN
	Enrolment: Participants may need to organize or reorganize themselves and others in order to collectively contribute to the work involved in interventions and their components.[68]	CPEN
	Legitimation: An important component of relational work around interventions and their components is the work of ensuring that other participants believe it is right for them to be involved and that they can make a valid contribution to it.[68]	CPLE
	Activation: Once it is underway, participants need to collectively define and enact the actions and procedures needed to sustain interventions and their components and to stay involved.[68]	CPAC
Collective Action	Collective action through which effort is invested in an intervention and its components: participants mobilize skills and resources and make a complex intervention workable. This work frames how participants realize and perform intervention components in practice.[50]	CA
	Interactional Workability: This refers to the interactional work that people do with each other and with the components of interventions and their components when they seek to operationalize them in everyday settings.[67]	CAIW
	Relational Integration: This refers to the knowledge work that people do to build accountability and maintain confidence in interventions and their components and in each other as they use them.[67]	CARI
	Skill set Workability: This refers to the allocation and training work that underpins that is built up around interventions and their components as it is operationalised in the real world. [67]	CASW

	Contextual Integration: This refers to the resource work – supporting interventions and their components through the allocation of different kinds of resources and the execution of protocols, policies and procedures. [67]	CACI
Reflexive Monitoring	Reflexive monitoring through which the effects of an intervention and its components are appraised: participants contribute to enacting intervention components through work that assembles and appraises information about their effects and utilize that knowledge to reconfigure social relations and action.[50]	RM
	Systematization: participants in interventions and their components may seek to determine how effective and useful it is for them and for others and this involves the work of collecting structured information in a variety of ways.[68]	RMSY
	Communal appraisal: participants work together - sometimes in formal collaboratives, sometimes in informal groups to evaluate the worth of interventions and their components They may use many different means to do this drawing on a variety of experiential and systematized information.[68]	RMCA
	Individual appraisal: Participants in interventions and their components also work experientially as individuals to appraise its effects on them and the contexts in which they are set. From this work stem actions through which individuals express their personal relationships to new technologies or complex interventions.[68]	RMIA
	Reconfiguration: appraisal work by individuals or groups may lead to attempts to redefine procedures or modify interventions and their components.[68]	RMRE
Contextual features of interventions and their components	Contexts provide social structural and social cognitive resources and we can frame these in relation to different mechanisms. [These] are concerned with any context's capacity to accommodate implementation processes.[50]	CF
	Plasticity: The extent to which interventions and their components are malleable and can be moulded to fit their contexts.[70,300]	CFPL

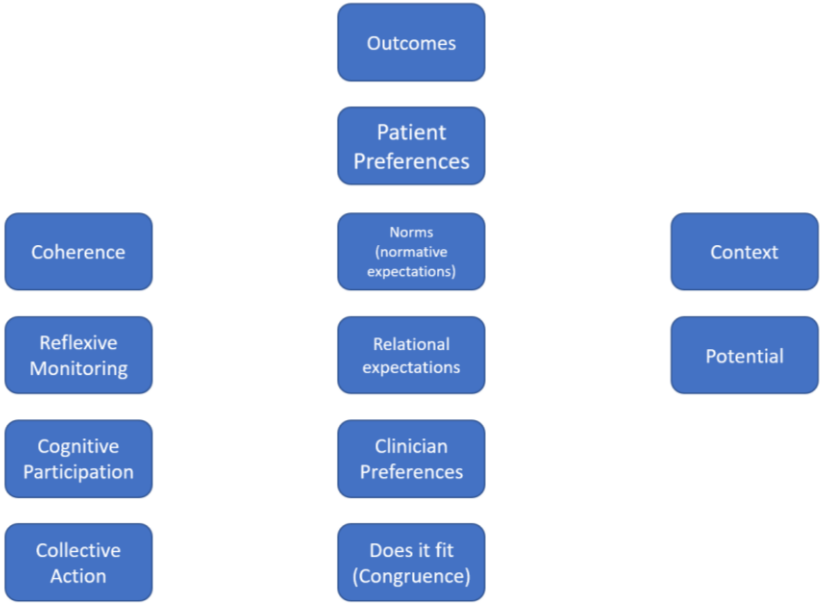
	Elasticity: The extent to which contexts can be stretched or compressed in ways that make space for interventions and their components and allow them to fit.[70]	CFEL
	Coupling: Relations of interdependence between people, interventions and their components and the contexts in which they are working.[70,301]	CFCO
Negotiated outcomes	NPT characterizes contexts as dynamic; an important prediction of the theory is that how participants in implementation processes relate to other actors, processes and structures to be found in their environments really does matter.[50]	NO
	Norms and Normative restructuring: Changes to professional norms, rules and resources as a result of working with interventions and their components.[70]	NONO
	Roles and Relational restructuring: Changes to the ways that people are organised and relate to each other as a result of working with interventions and their components.[70]	NORO
	Integration: Variable reproduction and sustainment of enacted intervention components over time and between settings.[68]	NOIN
	Intervention success: experienced workability and integration in contexts.[300]	NOIS
Potential	[These are] concerned with the ways in which participants relate to the activities involved in implementing intervention components. These are social cognitive resources.[50]	PO
	Individual readiness: Participants’ readiness to translate individual beliefs and attitudes about interventions and their components into behaviours that are congruent, or not congruent, with (new) system norms and roles.[69]	POIR
	Shared commitments: Participants’ readiness to translate shared beliefs and attitudes about interventions and their components into behaviours that are congruent, or not congruent, with (new) system norms and roles.[69]	PISC

	External (exogenous) processes and events that shape the capacity of participants to implement and operationalize interventions and their components (e.g. Austerity, Covid).[69]	PIEX
	Internal (endogenous) processes and events that shape the capacity of participants to implement and operationalize interventions and their components (e.g. staff shortages, strategic initiatives).[69]	PIEN

Appendix O

Appendix P Iterative Development of the Phase 4 model

Following the integrative analysis of data, I identified and characterised the newly developed constructs from all phases of the CONNECT Project. These constructs are demonstrated below in Figure 26 and defined within the thesis in section 9.5.3 Constructs of the theory on page 223.



Appendix P

Figure 26 Constructs for the Phase 4 model following integrative analysis of data

I then mapped these constructs to explain how preferences are constructed by patients. One of the things I struggled with here was where ‘choice’ fit in. I used West et al’s system for representing theories[302] to illustrate the relationships between constructs, with a uni-directional arrow indicating a one sided relationship and dual arrows representing a transformative relationship.

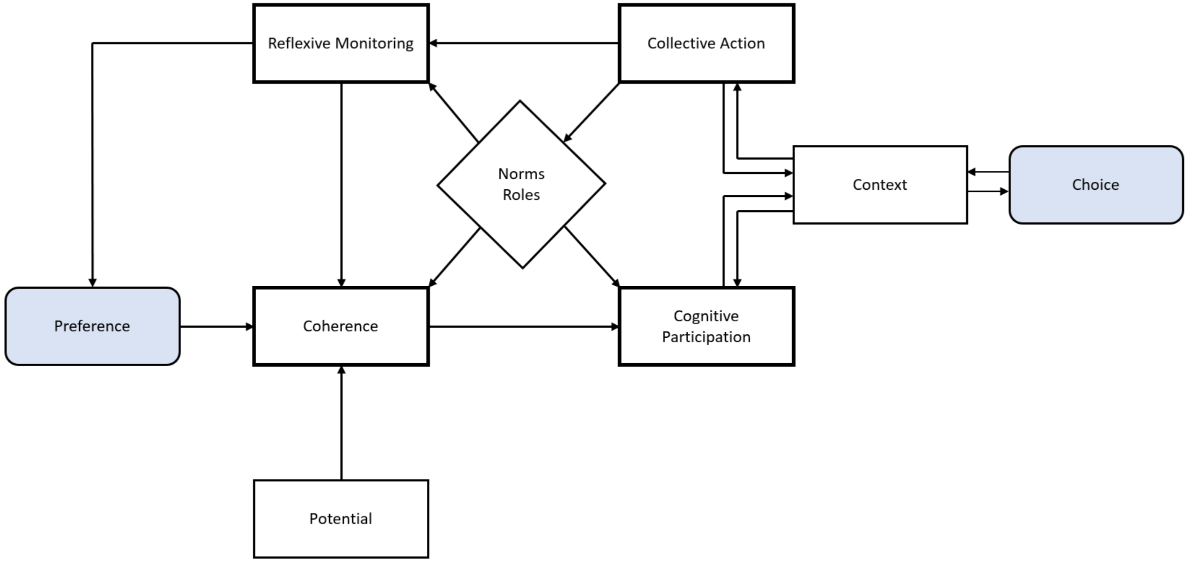


Figure 27 First iteration of the Phase 4 model

The second iteration of the model mapped the constructs from the previous phases and also included clinician preferences.

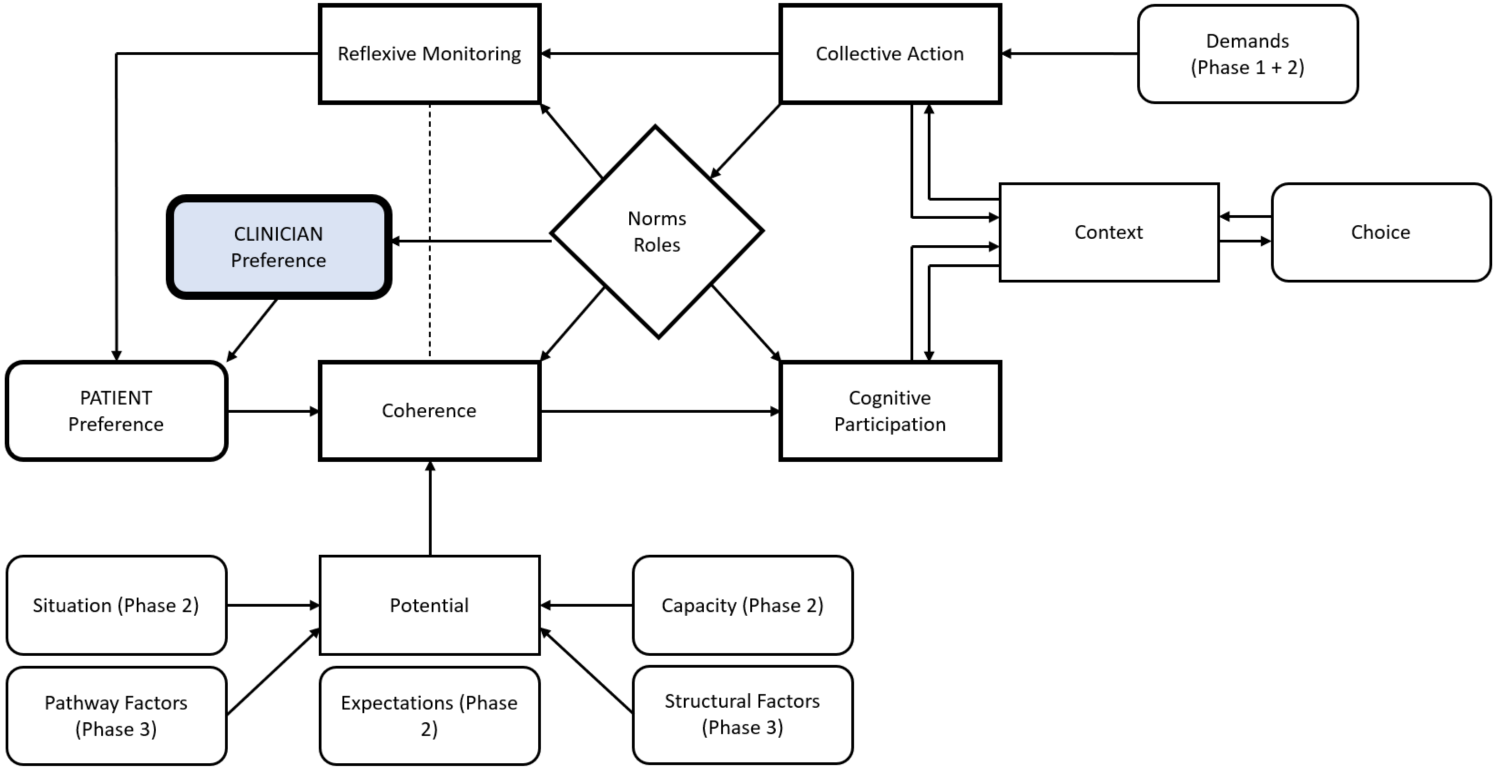


Figure 28 Second iteration of the Phase 4 model

Appendix P

Within the next phase of the model, norms and roles were placed at one end of the model. These directly informed coherence (sense making) and cognitive participation (investing commitment) as the start of the cascade of implementation processes. Whilst this iteration of the model was helpful for me to make sense of the relationships between constructs, it did not offer an explanation about preference

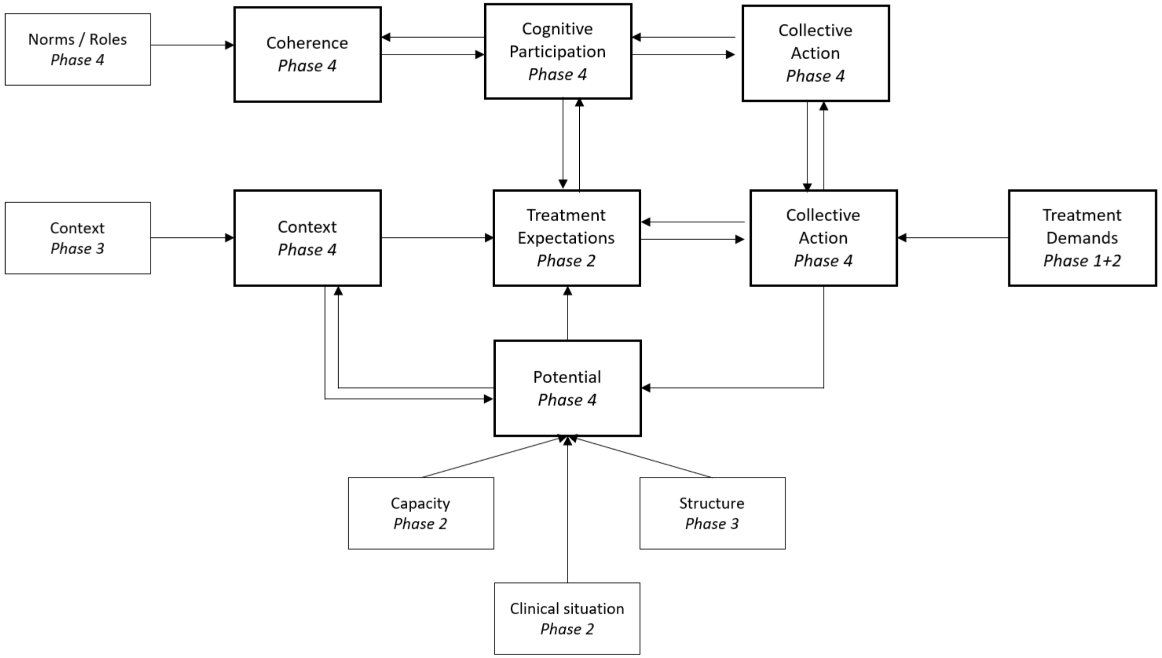


Figure 29 Third iteration of the Phase 4 model

This iteration of the model introduced the concept of alternatives for a total subjective comparative evaluation. One of the challenges I had found when trying to explain why a patient prefers VC or F2F with the previous models was to illustrate how these alternatives are influenced by the different implementation processes and context. This model attempted to highlight the important factors that shape preferences

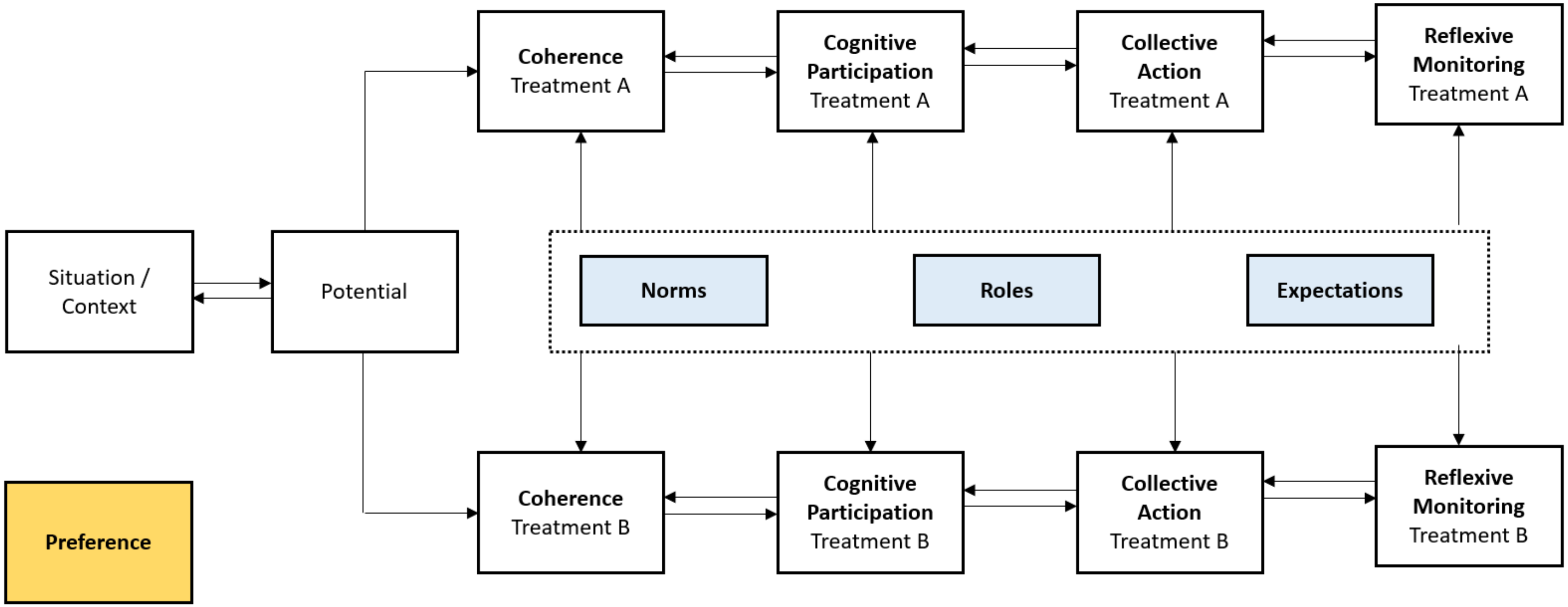


Figure 30 Fourth iteration of the Phase 4 model

Appendix P

This was the first model that had preference as an output of an implementation process that was dependent on contextual factors

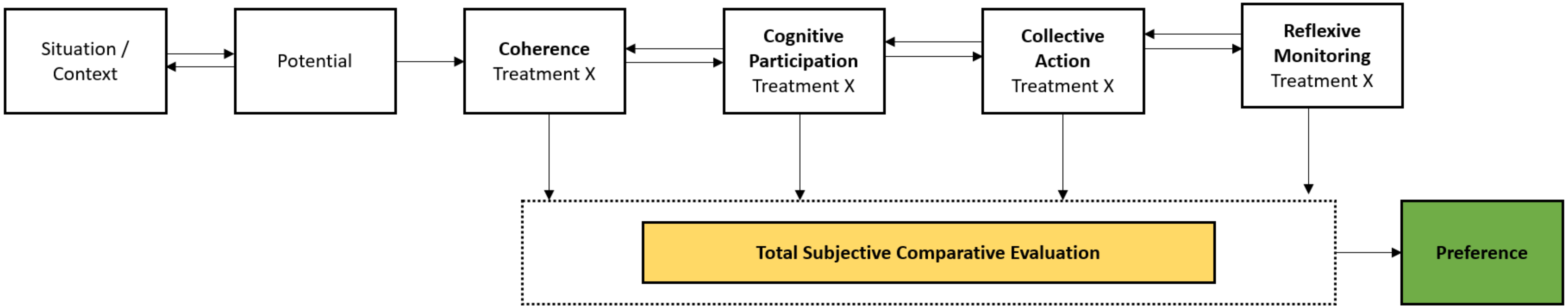


Figure 31 Fifth iteration of the Phase 4 model

This final version of the model included preference, choice and outcomes. The model is used to explain how patients construct their preferences

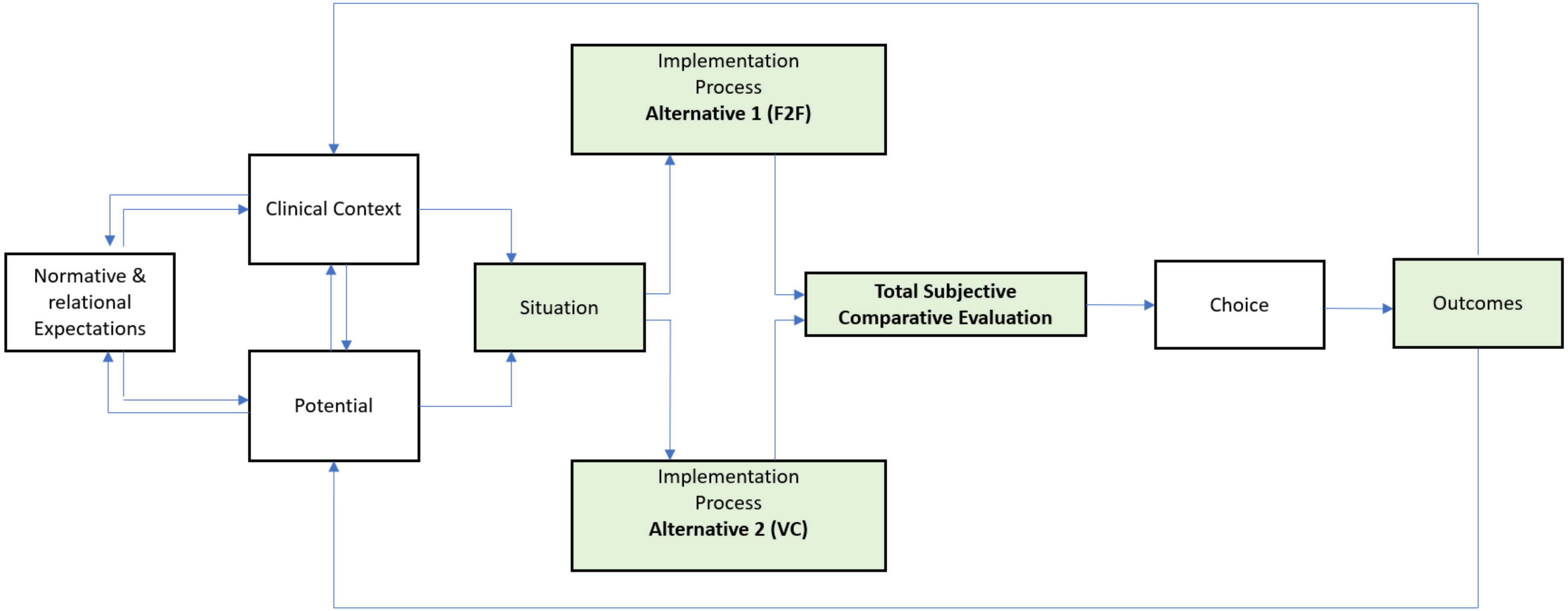


Figure 32 Sixth iteration of the Phase 4 mode

Appendix P

The final model was then refined to consider how patient preferences are orientated amongst clinician and organisational preferences

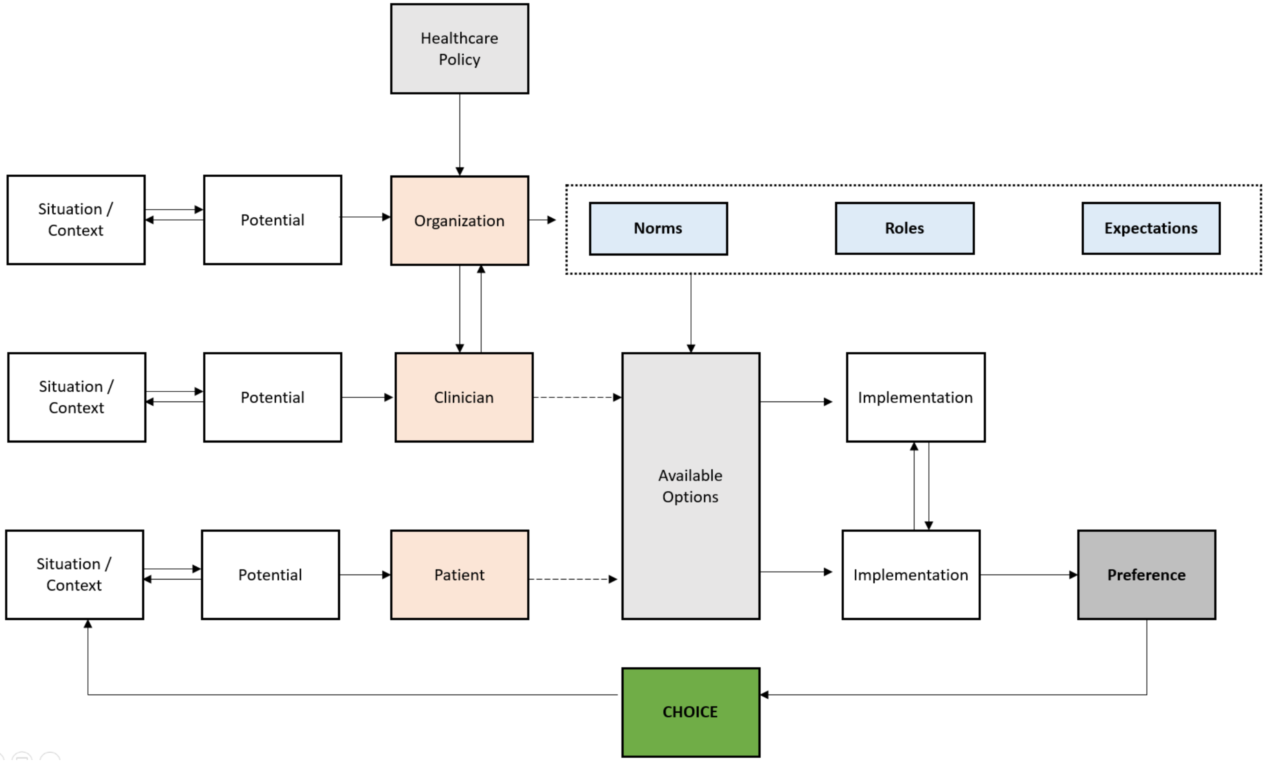


Figure 33 Model to illustrate how patient preferences are organised in practice

Appendix Q Standards for Reporting Qualitative Research - Phase 4 Paper

	Item	**Page**
Title	Item 1. Title: Concise description of the nature and topic of the study. Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended.	1
Abstract	Item 2. Abstract: Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions.	1
Problem Formulation	Item 3. Problem Formulation: Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement.	2
Purpose or research question	Item 4. Purpose or research question: Purpose of the study and specific objectives or questions.	2
	Item 5. Qualitative approach and research paradigm: Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., post-positivist, constructivist/interpretivist) is also recommended; rationale	3-4
	Item 6. Researcher characteristics and reflexivity: Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions,	4

	approach, methods, results and/or transferability.	
Context	Item 7. Context: Setting/site and salient contextual factors; rationale.	3
Sampling strategy	Item 8. Sampling strategy: How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale.	3
Ethical issues pertaining to human subjects	Item 9. Ethical issues pertaining to human subjects: Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues.	Title Page
	Item 10. Data collection methods: Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods and modification of procedures in response to evolving study findings; rationale.	3
Data collection instruments and technologies	Item 11. Data collection instruments and technologies: Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study.	3 Appendix 1
Units of study	Item 12. Units of study: Number and relevant characteristics of participants, documents, or events included in the study; level of participation.	5

Data processing	Item 13. Data processing: Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding and anonymisation / de-identification of excerpts.	3
Data analysis	Item 14. Data analysis: Process by which inferences, themes, etc. were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale.	5-6
Techniques to enhance trustworthiness	Item 15. Techniques to enhance trustworthiness: Techniques to enhance trustworthiness and credibility of data analysis,(e.g., member checking, triangulation, audit trail); rationale	3
Synthesis and interpretation	Item 16. Synthesis and interpretation: Main findings (e.g., interpretations, inferences and themes); might include development of a theory or model, or integration with prior research or theory.	5-6
Links to empirical data	Item 17. Links to empirical data: Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings.	Appendix 4
	Item 18. Integration with prior work, implications, transferability and contribution(s) to the field: Short summary of main findings, explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalisability; identification of unique contribution(s) to scholarship in a discipline or field.	14
Limitations	Item 19. Limitations: Trustworthiness and limitations of findings	14
Conflicts of interest	Item 20. Conflicts of interest: Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed.	Title Page

Funding	Item 21. Funding: Sources of funding and other support; role of funders in data collection, interpretation and reporting.	Title Page

Appendix R RNOH Joint Decision-Making Risk Assessment Form for F2F

Name: hospital number:

Joint Decision-Making Risk Assessment Form for F2F

Reasoning for F2F

- Clinical Risk ☐
    - Assessment ☐
    - Treatment ☐
- Communication Risk ☐
    - Patient ☐
    - Equipment ☐
- Safeguarding Risk ☐
- Please specify

*See **Therapies Out-patient Service RISK ASSESSMENT DOCUMENT** for further detail*

Patient Information

☐You will not be able to bring anyone to your appointment, unless it is essential

☐The therapist may not be able to maintain social distancing but will be wearing face mask, gloves and apron as appropriate.

☐You would also need to wear a mask.

☐Physical assessment will include: Examining the affected and surrounding areas.

☐You may be asked to remove some clothing so we can see how you move, always respecting your privacy and dignity

☐Information above provided

COVID Risk screening Tool

	Score
Age	
Gender/BAME	
Pregnancy	
Relevant health Conditions:	
Total:	

Low (1-6) ☐ **Mod (7-8)** ☐ **high (9+)** ☐ ***See Patient covid risk screening tool below***

Appendix R

This is a tool for you – do you have anyone else in your household that you have to consider?

Joint Decision Agreed: F2F to be arranged ☐ **Not for F2F** ☐

Further Notes: Click here to enter text.

Date and sign:

Patient COVID Risk screening Tool

Risk	Score 1	x	Score 2	x	Score 3	x	Score 4	x
Age	Below the age of 49		50-59		60-69		70+	
Gender and Ethnicity	Female White		Male White		Male or Female BAME			
Relevant health condition - see below	No underlying health condition		Health condition identified as low risk from accompanying document		Health condition identified as moderate risk from accompanying document		Health condition identified as significant risk from accompanying document	
PREGNANCY					Under 28 weeks gestation with no underlying health conditions		Over 28 weeks gestation or with underlying health conditions Pregnant patients at any stage with underlying health conditions	

Low (1-6)	**Moderate (7-8)**	**High (9+)**

Appendix R

Guidance on categorisation of patients through Risk Assessment

This guidance has been created from the Royal National Orthopaedic NHS Trust's **'Further guidance on supporting vulnerable colleagues through risk assessment'** to identify and categorise the level of risk for underlying health conditions for our patients.

Preserving and protecting the health, safety and wellbeing of our patients and staff and keeping them well is critical for the NHS as we respond to the coronavirus outbreak (COVID-19). It is essential that NHS organizations take every effort to support the physical and mental wellbeing of our patients and staff to enable them to stay healthy and protect themselves, colleagues, patients and families as we continue to deliver services through this challenging period.

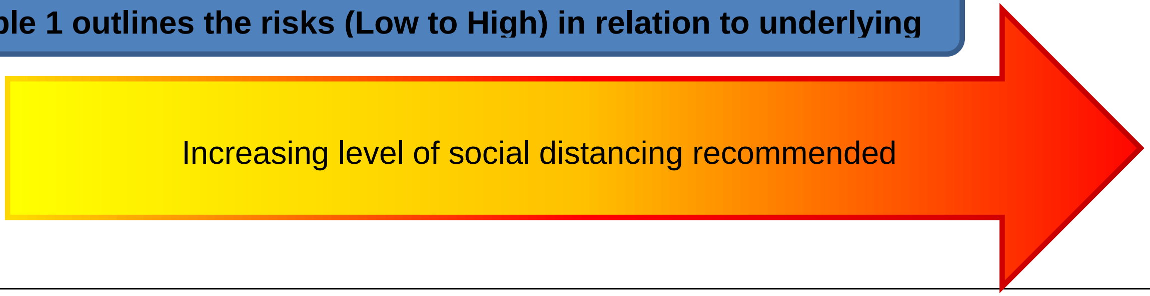
The Government has been actively reviewing the advice to protect those people who are at significantly increased risk from COVID-19 due to underlying health conditions, over 70's and those who are pregnant. The following guidance has been developed to provide further support to staff when completing risk assessments for patients.

The table below together with the risk assessment for joint decision making tool should help staff to determine whether patients' underlying health conditions are:

- low risk 2
- moderate risk 3
- high risk 4

Appendix R

Table 1 outlines the risks (Low to High) in relation to underlying



	Risk Categories by Condition		
Condition	**2 Low Risk**	**3 Moderate Risk**	**4 High Risk**
Weakened Immune System (excluding cancers)		A weakened immune system as the result of conditions such as: HIV and AIDS SLE / Lupus Rheumatoid or medicines such as steroids Chemotherapy or immune modulators	Solid organ transplant patient recipents Bone marrow or stem cell transplants in the last 6 months, or who are still taking immunosuppression drugs. People with rare diseases and inborn errors of metabolism that significantly increase the risk of infections (such as SCID, homozygous sickle cell). People on immunosuppression therapies sufficient to significantly increase risk of infection.

Cancers		Cancer – chemotherapy or XRT completed in the last 6 months	Cancer who are undergoing active chemotherapy or radiotherapy for lung cancer. Cancers of the blood or bone marrow such as leukaemia, lymphoma or myeloma who are at any stage of treatment People having immunotherapy or other continuing antibody treatments for cancer People having other targeted cancer treatments which can affect the immune system, such as protein kinase inhibitors or PARP inhibitors. People who have had bone marrow or stem cell transplants in the last 6 months, or who are still taking immunosuppression drugs.

Appendix R

Heart Conditions	Cardiac conditions such as previous heart attack with no ongoing problems, Controlled high BP, etc.	Heart valve disease that is severe and associated with symptoms (regularly feel breathless, or you have symptoms from your heart valve problem despite medication, or if you are waiting for valve surgery). Recent open-heart surgery in the last three months (including heart bypass surgery). Congenital heart disease (any type) also any of the following: lung disease, pulmonary hypertension, heart failure, you're over 70, you are pregnant, or if you have complex congenital heart disease (such as Fontan, single ventricle or cyanosis) Cardiomyopathy (any type) if you have symptoms such as breathlessness, or it limits your daily life, or you've been told you have problems with your heart function.	Chronic heart disease, such as heart failure
Respiratory Conditions	Mild asthma- never hospitalised or needing oral steroids in last 2 years Use of CPAP machine for Sleep Apnoea	Chronic (long-term) respiratory diseases, such as problematic asthma, COPD, emphysema or bronchitis that have required a hospital admission or a course of oral steroids within the last 2 years	People with severe respiratory conditions ie all cystic fibrosis, severe asthma and severe COPD (including those who have required multiple hospital admissions or courses of oral steroids within the last 2 year), confirmed occupational lung disease and pulmonary hypertension

Neurological Disorders	Mild multiple sclerosis only with sensory or visual changes Cerebral palsy (i.e. GMFCS Level 1-2, mobilising independently or may need handheld device for longer distances) Well controlled epilepsy Fibromyalgia / ME	Chronic neurological conditions, such as Parkinson's disease, motor neurone disease, multiple sclerosis Learning disability or cerebral palsy (i.e. GMFCS Level 3-5, needs to use special equipment to be able to walk, or might be wheelchair dependent or need lifelong care)	
Renal Disorders	Kidney disease Stage 1 &2	Chronic kidney disease stage 3a	Chronic kidney disease stage 3b, 4 – 5, Kidney disease requiring dialysis
Liver Disorders	Fatty liver disease Haemochromatosis Diabetes controlled by diet or tablets with	Chronic liver disease, such as active hepatitis Chronic liver disease, such as active hepatitis Diabetes well controlled on insulin and without diabetic complications	

	no diabetic complications		
Other Conditions		Problems with the spleen, such as sickle cell disease or spleen removed Being seriously obese (a BMI of 40 or above)	Diabetes controlled on insulin or diabetes with diabetic complications or poor glucose control Severe diseases of body systems

Appendix S Anthony Gilbert Academic Outputs

S.1 Publications

S.1.1 PhD papers

Gilbert, A.W., Jones, J., Stokes, M., Mentzakis, E. and May, C.R., 2019. Protocol for the CONNECT project: a mixed methods study investigating patient preferences for communication technology use in orthopaedic rehabilitation consultations. *BMJ open*, *9*(12).

Gilbert, A.W., Jones, J., Jaggi, A. and May, C.R., 2020. Use of virtual consultations in an orthopaedic rehabilitation setting: how do changes in the work of being a patient influence patient preferences? A systematic review and qualitative synthesis. *BMJ open*, *10*(9), p.e036197.

Gilbert, A.W., Jones, J., Stokes, M. and May, C.R., 2021. Factors that influence patient preferences for virtual consultations in an orthopaedic rehabilitation setting: a qualitative study. *BMJ open*, *11*(2), p.e041038.

Gilbert, A.W., Mentzakis, E., May, C.R., Stokes, M. and Jones, J., 2021. Patient preferences for use of virtual consultations in an orthopaedic rehabilitation setting: Results from a discrete choice experiment. *Journal of Health Services Research & Policy*, p.13558196211035427.

Gilbert, A.W., May, C.R., Brown, H., Stokes, M. and Jones, J., 2021. A qualitative investigation into the results of a discrete choice experiment and the impact of COVID-19 on patient preferences for virtual consultations. *Archives of physiotherapy*, *11*(1), pp.1-13.

Gilbert, AW, Jones, J, Stokes, M, May, CR. Patient, clinician and manager experience of the accelerated implementation of virtual consultations following COVID-19: a qualitative study of preferences in a tertiary orthopaedic rehabilitation setting. Health Expect. 2022; 25: 775- 790.

S.1.2 Non PhD papers relating to PhD

Gilbert, A.W., Billany, J.C., Adam, R., Martin, L., Tobin, R., Bagdai, S., Galvin, N., Farr, I., Allain, A., Davies, L. and Bateson, J., 2020. Rapid implementation of virtual clinics due to COVID-19: report and early evaluation of a quality improvement initiative. *BMJ Open Quality*, *9*(2), p.e000985.

Gilbert, A.W., Booth, G., Betts, T. and Goldberg, A., 2021. A mixed-methods survey to explore issues with virtual consultations for musculoskeletal care during the COVID-19 pandemic. *BMC Musculoskeletal Disorders*, *22*(1), pp.1-10.

Gilbert, A.W., Davies, L., Doyle, J., Patel, S., Martin, L., Jagpal, D., Billany, J.C. and Bateson, J., 2021. Leadership reflections a year on from the rapid roll-out of virtual clinics due to COVID-19: a commentary. *BMJ Leader*, pp.leader-2020.

Booth, G., Williams, D., Patel, H. and Gilbert, A.W., 2021. What is the content of virtually delivered pain management programmes for people with persistent musculoskeletal pain? A systematic review. *British Journal of Pain*, p.20494637211023074.

Williams, D., Booth, G., Cohen, H., Gilbert, A., Lucas, A., Mitchell, C., Mittal, G., Patel, H., Peters, T., Phillips, M. and Rudge, W., 2021. Rapid design and implementation of a virtual pain management programme due to COVID-19: a quality improvement initiative. *British Journal of Pain*, p.20494637211039252.

Booth, G., Zala, S., Mitchell, C., Zarnegar, R., Lucas, A., Gilbert, AW. 2022. The patient acceptability of a remotely delivered pain management programme for people with persistent musculoskeletal pain: A qualitative evaluation. *British Journal of Pain,* DOI: 10.1177/20494637221106411

S.1.3 Academic Presentations

Gilbert, A., Jaggi, A., Jones, J. and May, C., 2019. What Is The Effect Of Communication Technology On The Work Of Being A Patient In Orthopaedics? A Systematic Review. *International Journal of Therapy And Rehabilitation*, *26*(6), pp.3-3. [Presentation at the Physiotherapy Research Society Conference, London]

Gilbert, A., Jaggi, A., Jones, J. and May, C., 2019. What Is The Effect Of Communication Technology On The Work Of Being A Patient In Orthopaedics? A Systematic Review. *Physiotherapy*, 2019. [Presentation at World Congress for Physical Therapy, Geneva]

Gilbert A., 2020 The CONNECT project: a mixed methods study investigating patient preferences for communication technology use in orthopaedic rehabilitation consultations [Invited speaker at the Advanced Physiotherapy Practitioner Conference]

Gilbert A 2020 Patient preferences for virtual orthopaedic rehabilitation consultations. (invited speaker) Virtual Physiotherapy UK Conference.

Gilbert, A.W., Jones, J., Stokes, M. and May, C.R., 2021. What factors influence patient preferences for the use of virtual consultations in an orthopaedic rehabilitation setting? a qualitative investigation. [Presentation at the Physiotherapy Research Society Conference, Online]

Gilbert, A.W., Jones, J., Stokes, M. and May, C.R., 2021. Factors that influence patient preferences for virtual consultations in an orthopaedic rehabilitation setting: a qualitative study. 2021 [Presentation at World Physiotherapy Conference]

Gilbert, A.W., Mentzakis, E.M., May, C.R., Stokes, M. Brown, H., and Jones, J., 2021 What are patient preferences for virtual consultations for orthopaedic rehabilitation? Results from a Discrete Choice Experiment (DCE) and qualitative interviews [Presentation at World Physiotherapy Conference]

Gilbert, A.W., Jones, J., Stokes, M. and May, C.R., 2021. Factors that influence patient preferences for virtual consultations in an orthopaedic rehabilitation setting: a qualitative study. 2021 [Presentation at Virtual Physiotherapy UK Conference]

Gilbert, A.W., Mentzakis, E.M., May, C.R., Stokes, M. Brown, H., and Jones, J., 2021 What are patient preferences for virtual consultations for orthopaedic rehabilitation? Results from a Discrete Choice Experiment (DCE) and qualitative interviews [Presentation at Virtual Physiotherapy UK Conference]

Appendix T Anthony Gilbert PhD Non-Academic Outputs

NIHR Blog

https://www.nihr.ac.uk/blog/anthony-gilbert-my-research-career-so-far-and-advice-for-others/11010

CSP Covid / Digital Physio Case Studies

https://www.csp.org.uk/news/coronavirus/remote-service-delivery-options/digital-physiotherapy-case-studies

Digital Response to COVID-19 Frontline Article July 2020

https://www.csp.org.uk/frontline/article/digital-response-covid-19

Nightingale June 2020 Frontline

https://www.csp.org.uk/frontline/article/nights-days-nightingale

Covid-19 Digital May 2020 Frontline

https://www.csp.org.uk/frontline/article/covid-19-digital-solutions

Brockley Radio Podcast 15th May 2020

https://www.spreaker.com/show/covid-19-special-shows

Physio Matters COVID-19 Emergency Podcast

https://podcasts.apple.com/gb/podcast/emergancy-session-3-remote-consultations-anthony-gilbert/id785762010?i=1000470155458

Online commentary CSP Website – online orthopaedic support

https://www.csp.org.uk/frontline/article/research-findings-online-support-knee-arthritis

PPA Webinar

https://www.youtube.com/watch?v=0ktc9u-11YI&feature=youtu.be

Team Meeting webinar the Maudsley

25th June 2020 via Zoom

Team Meeting webinar QMUL

1st July 2020 via Zoom

Reaction Magazine UoS Space Article

https://issuu.com/university_of_southampton/docs/1014_reaction_magazine_summer_2020_-_issuu

NIHR COVID-19 Clinical Academic on the front-line Blog

https://www.nihr.ac.uk/documents/case-studies/clinical-academic-on-the-front-line/25257

NHS Benchmarking webinar

https://www.nhsbenchmarking.nhs.uk/events/outpatients-good-practice-webinar

Contributed to Teams webinar sharing RNOH's learning from COVID19 virtual consultations 10Th September 2020

RNOH Board

Experience of virtual consultations - 24th September 2020 via Zoom

Team meeting NIHR ARC North Thames

Overview of research 20th October 2020 via Zoom

NOA Webinar

Maximising Evidence based Conservative Orthopaedic management during the Pandemic (4th November 2020 via zoom)

'Virtual Therapy Clinics: Patient preferences for virtual orthopaedic rehabilitation consultations'

https://nationalorthopaedicalliance.co.uk/events/noa-covid-19-webinar-4-nov/

Team Meeting Chelsea and Westminster Outpatients Department

November 2020 via Teams

RNOH Board

Presentation to RNOH People committee 19th November 2020 via Teams

Association of Trauma and Orthopaedic Chartered Physiotherapists / Musculoskeletal Association of Chartered Physiotherapists

Patient preferences for virtual orthopaedic rehabilitation consultations – 18th January 202194

Ministry of Defence Presentation (Regional Rehab Unit CPD Event)

Patient preferences for virtual consultations – what should we consider?

25th February 2021

Oxford Brookes University

Final year physio students – how can we use VC in physiotherapy?

12th March 2021

RNOH Trust board

Presentation on integrating research and quality improvement – 25th March 2021

CSP & NHSx Digital Playbook Webinar

Implementation of virtual consultations and reflections on PhD findings.
https://www.nhsx.nhs.uk/key-tools-and-info/digital-playbooks/musculoskeletal-digital-playbook/

15th June 2021 (Online)

RNOH Outpatients Department

Research Update – how do we incorporate patient preferences? Teams – 17th June 2021

RNOH Board Peoples Committee

Research Update – how do we incorporate patient preferences? Teams – 18th June 2021

West Hertfordshire Hospitals

Advice on VC call with MSK Service Lead 7th July 2021

NIHR ARC South London Webinar

Rapid implementation of virtual consultations - https://www.youtube.com/watch?v=lzrDUHccs08

CONNECT Health Webinar

Can you put video consultations in the NHS? https://www.connecthealth.co.uk/connect-health-change/13-october/

ATOCP and CSP South Central Webinar

Implementation and Improvement: Together are they better than the sum of their individual parts? https://www.csp.org.uk/news/2021-11-10-view-recording-csp-south-central-regional-network-atocp-joint-event-quality

20th October 2021