Understanding Virtual Group Interventions in Healthcare: Exploring Experiences

Submitted by Charlotte Louise Reburn to the University of Exeter as a thesis for the degree of Masters by Research in Medical Studies, November 2023

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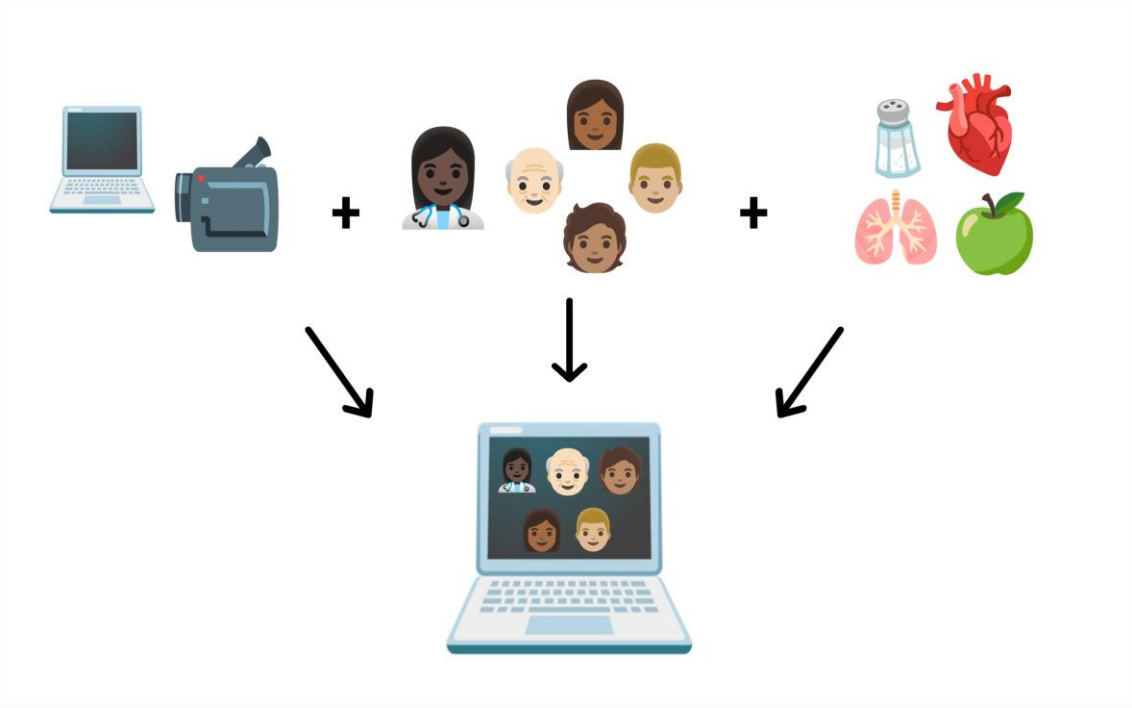

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Abstract

Background

In recent years, virtual group-based interventions have been increasingly used in healthcare to support health promotion and prevention and management of long-term health conditions. Examples of common chronic physical conditions that have been supported by these interventions include type 2 diabetes mellitus and hypertension.

This thesis aims to explore adult participant engagement with, and experiences of, virtual group-based health interventions. Understanding how and where these interventions have been used, and exploring how participants have received them, is important for informing how their use can be optimised.

Methods

The work undertaken for this thesis consisted of two projects: a mixed-methods systematic review and a qualitative interview study. For the review, searches were conducted in five databases in June 2022, to identify videoconference-based group interventions targeting chronic physical conditions. Findings from included studies were synthesised using the convergent integrated approach to mixed-methods synthesis. For the interview study, participants and facilitators involved in a range of virtual group-based health interventions participated in semi-structured interviews exploring benefits, drawbacks, facilitators and barriers to virtual groups. Framework analysis based on themes generated by the review was used to summarise findings.

Results

Nineteen studies reporting on 17 interventions were included in the systematic review. Five main themes were generated: **1)** attendance and dropout; **2)** barriers to attending/engaging; **3)** experiences of using technology; **4)** experiences of intervention features; and **5)** experiences of group interactions. In interviews for the second study with six participants and four facilitators of virtual groups, these themes were largely supported. Overall, participants felt that a major advantage over in-person groups was a lack of travel, as well as forming bonds with fellow

participants. However, sometimes, social restrictions in virtual groups meant that these bonds took longer to form.

Conclusions

Findings suggest that virtual group interventions for preventing and/or managing chronic physical conditions represent a convenient and positive alternative to in-person groups. Recommendations for future interventions focused on ways to increase rapport and bonding in virtual groups. Future research could explore experiences across a wider range of conditions, including mental health conditions.

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Outputs from this thesis

Output	Event	Study	More info
Elevator pitch	School for Primary Care Research Trainees Meeting – May 2022	Both studies	See Appendix 1
Poster	University of Exeter Annual Research Event – June 2022	Systematic review	See Appendix 2
Poster	University of Exeter Doctoral College Poster Competition – June 2022	Systematic review	See Appendix 2
Poster	School for Primary Care Research Launch Event – June 2022	Both studies	See Appendix 3
Tweet	University of Exeter Doctoral College Tweet Your Thesis – June 2022	Both studies	See Appendix 4
Poster	Society for Academic Primary Care South West Conference – March 2023	Systematic review	See Appendix 5
Poster	UK Society for Behavioural Medicine Conference – March 2023	Systematic review	See Appendix 6
Poster	Faculty of Health and Life Sciences Early Career Researcher Conference – June 2023	Systematic review	See Appendix 6
Poster	University of Exeter Doctoral College Poster Competition – June 2023	Systematic review	See Appendix 7
Poster	School for Primary Care Research Showcase Event – September 2023	Systematic review	See Appendix 7

Linked outputs include three systematic reviews that are in preparation for publication: one on group interventions for hypertension by Dr Sinead McDonagh *et al.*,(1) one on type 1 diabetes education interventions in adolescents by Dr Emma Cockcroft *et al*. (PROSPERO registration), and one on social identity in groups by Ms Laura Hollands *et al*. (PROSPERO registration). For these reviews, I took part in title and abstract screening and full-text screening. For the former two reviews, I also took part in editing the manuscripts for publication.

Chapter 1: Introduction

The focus of this thesis is on virtual group interventions for preventing and/or managing chronic physical conditions, and the promotion of good health. Briefly, these comprise group-based videoconferencing sessions where all group members can see and hear each other in real-time. Participants may have, or be at risk of, a common health condition, and a facilitator is trained to help participants prevent or manage this condition over a series of sessions that take place across a set period of time.

This chapter will first briefly discuss chronic physical conditions, as a background for both projects in this thesis. The next section of this chapter will then break down the constituent elements of virtual group interventions, discussing specific definitions, as well as drawing from examples in the literature. It will begin with discussing group interventions, then virtual interventions, before finally combining the two elements to discuss virtual group interventions. This is followed by an outline of the aims and approach of this thesis, and the chapter then ends with an overview of the structure of the rest of the thesis.

1.1: Background: chronic physical conditions

Chronic physical conditions are common in adults, with 40% of those aged 65 and over in the UK living with at least one chronic condition.(2) These include type 2 diabetes mellitus, chronic obstructive pulmonary disease (COPD), asthma, and hypertension, as well as cardiovascular conditions.(3) Additionally, many people are at risk of developing chronic conditions, such as the estimated 10 million people in the UK who are at high risk of developing type 2 diabetes, a statistic that has continued to rise in recent years.(4,5) The risk of developing many chronic conditions can be reduced and the management of existing conditions can be improved through adopting healthy lifestyle choices.(6,7) For example, those with and at high risk of developing type 2 diabetes may be encouraged to increase physical activity levels and improve their diets, to lose weight and reduce blood sugar levels.(8) This can be challenging, and continuing with programmes to support lifestyle changes often requires a sustained effort from individuals.(9) Studies have also shown that self-management of chronic conditions may be more difficult for some people than others, leading to poorer outcomes in these patients.(10)

Increasing efficiency of healthcare interventions is particularly important in the context of the NHS in the UK. Alongside a rise in the prevalence of chronic conditions, the Covid-19 pandemic has exacerbated existing strains on NHS finances and resources.(11) When combined with the increased demand experienced in recent years, this has increased pressure on healthcare staff, and workforce retention and staff wellbeing and burnout have become key issues facing many healthcare providers.(12–14) Many staff are expected to leave their professions in the near future, with one survey study finding that 70% of GPs in the South West of the UK had planned to leave patient-facing care, reduce their working hours, or take a career break.(15) Therefore, it is vital that new interventions designed to improve patient health do not exacerbate this issue, and are time- and resource-efficient for healthcare professionals.

1.2: Group interventions

Group interventions have been used within healthcare for many years, including to provide education and support to help patients prevent or manage different physical health conditions.(16–19) They are often delivered within primary care or community settings, but are sometimes delivered from hospitals or more specialised centres. The groups typically include a small number of participants (usually around 6-10) with a shared health condition.(20) Groups are usually facilitated by a healthcare professional, such as a nurse, or a trained lay facilitator. Unlike group *consultations*, which are usually less frequent and don't involve a consistent group of participants, in the types of group interventions discussed in this thesis, the same participants attend a series of sessions regularly over a defined period of time.(16,21) Sessions usually focus on different aspects of preventing or managing a condition, with an emphasis on sharing experiences and group discussion. Sessions are designed to educate participants, as well as to support participants to change their behaviour to reduce their risk of a condition developing or worsening and to improve symptoms and quality of life.(16,20)

There are many examples of group interventions being utilised successfully for the prevention and management of physical conditions.(16,22,23) For example, type 2 diabetes mellitus is one of the conditions that features most heavily in the

literature on group interventions.(18,24,25) Groups have been used to support both the prevention and management of the condition, with sessions featuring participant-led collaborative learning focusing on topics including diet, physical activity, and successful self-management of blood glucose levels.(18,24,25) Managing the emotional aspects of having a long-term condition is also a key feature of these interventions – for example, participants may discuss their emotions associated with a diagnosis of type 1 diabetes, including sharing their experiences of managing diabetes distress and isolation.(26)

Many virtual group interventions are based on existing in-person group interventions, which have proven to be efficacious – for example, the NHS Diabetes Prevention Programme.(27) Aside from efficacy, there are some clear advantages of group interventions for supporting behavioural changes that are important in preventing and managing chronic physical conditions, when compared to individual interventions. For example, group settings allow participants to meet with other individuals who share their health condition, to share experiences and advice as well as to learn from one another, and have typically been very positively received by their participants.(26,28) Group settings within healthcare have been historically more participant-led, and place a focus on self-management and participants using their own expertise to help with their condition.(26) Group settings also allow participants to develop a social circle of other individuals with the same condition as them, and developing a sense of affinity, community, and mutual support between other group members is an important feature of group interventions.(16,26,28,29) Participants have also commented that they feel that a group setting gives them greater access to healthcare professionals' focused attention.(30)

Aside from their advantages and disadvantages for participant and facilitator experience, one unique feature of group interventions is the group processes for behaviour change that they can initiate within participants. For example, Borek *et al.* have shown that there are some behaviour change techniques and processes that are unique to group interventions and are not present within interventions delivered individually.(22,29) These *interpersonal* behaviour change techniques involve interacting with other group members and include sharing experiences, being held accountable to others, social learning and modelling of behaviour, and group support.(29) For example, participants have previously remarked that

being a part of a group gave them an opportunity for self-monitoring and accountability, which helped to enhance their motivation to achieve their goals.(22) Goal setting and holding others accountable for those goals is an important interpersonal behaviour change technique that features in group interventions.(31) Participants may draw self-efficacy from comparison to others, and from encouragement and peer support from their groups.(26)

As well as advantages for participants, group sessions may be more efficient than individual consultations. Indeed, the Covid-19 pandemic has placed further financial strain on an already stretched NHS, as well as exacerbating staff shortages, with many care providers recently making the decision to leave the profession, particularly in primary care.(32) Increased efficiency may come from being able to discuss issues with many participants at once, which may also reduce waiting times for interventions.(17,31) This has led to group-based formats becoming more commonly used for delivering primary care services that have traditionally been delivered individually, as they theoretically represent a more efficient use of limited staff time and resources than individual approaches.(6,21,33)

Intervention facilitators have also commented that group sessions can be more interesting to deliver than individual sessions.(31) Providers have commented that they are able to enter into deeper, fuller conversations with their participants in these group sessions, due to their longer duration compared to interventions that are delivered individually.(31) Similarly, different healthcare professionals can act as facilitators during different stages of a group intervention, and the providers have perceived this chance for interdisciplinary collaboration as a further advantage.(28)

Despite the benefits of group interventions for participants and providers, several drawbacks to group interventions have been highlighted in the literature, which are important to consider. Providers have commented that group interventions can be more labour-intensive than individual interventions, and require buy-in from both clinical and administrative staff, because of logistical factors such as organising groups to accommodate schedules of all participants and facilitators.(34) Some providers have suggested that ‘champions’ of group interventions, acting in an organisational capacity, helped alleviate concerns around increased administrative workload for other staff members when setting

up the interventions.(28,31) Facilitators of group interventions also require adequate training, because they need to be able to appropriately manage group dynamics, as well as deliver information and provide support in a way that meets the perceived needs of both individuals and the wider group.(28,35)

For participants, barriers to attending group sessions have included scheduling conflicts and transportation issues.(28,31) Similarly, adjusting to being in a group setting can take some time for participants. For example, some participants have expressed concern regarding discussing certain sensitive health issues in a group.(22) Some subjects may simply be too sensitive to broach in a group environment and are perhaps more suited to an individual setting. This demonstrates that group settings may not be appropriate in all situations, and careful planning is required when designing and delivering group interventions. Therefore, further research into how best to inform more efficient and effective delivery of group interventions, and the means by which they may be delivered, is highly important.

1.3: Virtual interventions

Interventions delivered virtually, whereby participants take part from their location of choice rather than in-person, may be labelled with many different terms, including ‘virtual interventions’, ‘remote interventions’, ‘telehealth’, and ‘e-health’, to name a few.(36) ‘Virtual interventions’ has been chosen in this thesis to ensure consistency, although this may encapsulate many different delivery modes. Audio-only interventions involve telephoning participants to deliver the intervention.(37–39) Text-only interventions include SMS messaging, or text-only websites.(40–42) Some interventions are delivered through a dedicated website, involving multiple interactive components, experienced asynchronously by participants.(43–45) Virtual interventions may also include video-based interventions, such as live video chat.(46) In these interventions, participants and facilitators can see and hear one another in real-time. As outlined at the start of this chapter, such synchronous video-based interventions are the focus of this thesis.

Whilst the use and uptake of virtual interventions in UK healthcare has been steadily increasing over a number of years, the social restrictions and infection

control measures associated with the Covid-19 pandemic saw a further rapid acceleration in use of virtual interventions, with many existing in-person interventions transitioning to virtual delivery.(47–50) In many cases, virtual delivery meant that interventions could continue, when they would have otherwise been curtailed by the pandemic. Examples include a type 2 diabetes prevention intervention that had to be moved to remote delivery in April 2020, which involved in-person sessions transferring to pre-recorded video delivery, email delivery, and occasionally synchronous Zoom-based delivery.(50) In this case, it was found that engagement and communication were sometimes challenging, but the intervention team worked collaboratively to deliver care that met the needs of the participants at a time of social restriction.(50)

Many other advantages of virtual delivery experienced during this time were also reported before the pandemic. For example, reported advantages include increased convenience for participants, because of a lack of a need to travel.(51–53) Participants have also commented that they find it easier to schedule virtual interventions around their other commitments, such as working or caring commitments.(53) Similarly, some facilitators have commented that virtual delivery of healthcare is quicker and more convenient than in-person delivery.(51,52) For example, in one qualitative study exploring experiences of nurses in Australia during the Covid-19 pandemic, it was remarked that virtual delivery may lead to increased accessibility for participants, through a lack of travel, as well as increased efficiency and time saving for clinicians, opening up capacity for a greater number of appointments.(52)

However, some disadvantages of virtual delivery have also been reported. These include a lack of connection between the provider and the participant.(54) Despite some studies indicating that a more relaxed home setting improves rapport between participant and provider in a virtual intervention, some studies have reported facilitators struggling to build a rapport with their participants, and vice-versa, because of a lack of ability to perceive non-verbal social cues.(54,55) These missed social cues may be more present in virtual interventions that don’t include audio or video, such as text-only interventions, or audio-only telephone-based interventions.(52,55).

Accessing and confidently using the technology required for virtual interventions is also a concern. Some potential participants may be precluded from engaging

with virtual interventions simply because they lack the capability to use technology, or lack the technology itself.(52) As well as this, some concerns have been raised surrounding participant privacy and safeguarding during virtual interventions. Some participants have reported feeling worried about the security of their personal information, and some facilitators have expressed concern about the lack of control over where participants take part in interventions, for example, whether they are in a private space.(55)

Furthermore, it is unclear how behaviour change mechanisms operate within virtual interventions. Compared to in-person interventions, there is a lack of research in this area. One systematic review explored behaviour change mechanisms employed by mobile health (mHealth) interventions, but it is unclear whether these mechanisms would also pertain to other types of virtual intervention, including video-based interventions discussed here.(56) Due to differences in many aspects of the intervention compared to in-person delivery, such as potential changes to the social dynamic between participant and facilitator, it may be that certain change processes are modified or diluted when an intervention is delivered virtually. This demonstrates the importance of further research examining how participant and facilitator experiences may be impacted by virtual delivery of interventions, including those delivered in groups.

1.4: Virtual group interventions

Combining the two delivery modes previously discussed, virtual group interventions form the focus of this thesis. These are defined here as videoconference-based interventions where participants and facilitators can see and hear each other in real-time, and where multiple intervention sessions take place over a set period.

These types of virtual group interventions have been successfully utilised in the past to prevent and manage a range of health conditions. This includes physical health conditions, such as type 1 and type 2 diabetes mellitus, obesity, and chronic pain.(57–61) Despite some concerns, such as a lack of social connection between participants, many have been largely efficacious compared to controls – for example, in a study focusing on weight management, a video-based virtual group intervention was found to have significantly higher engagement, and a non-

significant increase in weight loss, compared to a text-based control.(61) Similarly, an intervention for diabetes self-management and diabetes distress found that video-based virtual group participants had significantly reduced diabetes distress compared to participants who received website-based telehealth without virtual group sessions.(58) Virtual groups have also been utilised for the management of mental health conditions, such as anxiety and depression, which have also been positively received by participants.(62–64) For example, a virtual group-based dialectical behaviour therapy intervention conducted during the pandemic found that, despite a perceived lack of social connection, virtual group participants experienced increased convenience and significantly higher attendance rates than an in-person control group.(62) In this thesis, the focus is specifically on virtual group interventions to prevent or manage chronic physical conditions.

Many group-based interventions that had originally taken place in-person shifted to being delivered virtually after the start of the Covid-19 pandemic. In many cases, the design of interventions had to be altered to enable virtual delivery. For example, a mental health intervention focused on wellbeing was forced to rapidly transition from in-person groups to virtual groups at the start of the pandemic.(63) Participants commented that although they initially preferred in-person delivery, they grew to appreciate the virtual groups, and the support and relationships that they provided.(63) Similarly, an intervention to promote physical activity in older adults was rapidly adapted to be delivered virtually, and participants found this acceptable, especially because of technical and social support that was offered.(65) This demonstrates the implications of the pandemic on in-person delivery, and the knock-on effects that a transition to virtual groups had on participant experiences of interventions.

Virtual group interventions have the potential to support the prevention and management of a wide range of chronic conditions in an effective and efficient way.(61,66–69) This is relevant and important, considering the current financial and resource-related challenges facing healthcare providers, as justifying the introduction of new interventions in a time of acute challenge is extremely difficult. The need for efficient chronic condition prevention and management is reflected in the NHS Long Term Plan.(70) This raises many issues that are directly addressed by virtual group interventions, such as improving the use of digital

technology, preventing illness, and easing pressures on staff members.(70) Similarly, in the NHS Five-Year Forward View, key goals included both increasing the use of health-related technologies as well as empowering patients to better self-manage their conditions.(71) Virtual group interventions have the potential to make positive progress towards both of these goals, as they have many key advantages.

Advantages of virtual groups often combine the advantages of both virtual delivery and a group setting as outlined above. For example, some participants have commented that they value the convenience of virtual delivery, because it means that they can fit the intervention in around their working lives and caring responsibilities.(72) Virtual groups have also been identified as convenient for participants with restricted mobility.(73) Furthermore, participants have commented that they appreciate the social connections that they gain from the virtual group setting, and they value the ability to share experiences and advice with their peers.(57,74,75) As well as this, participants have reported feeling comfortable and safe in virtual groups, and able to express themselves effectively.(75,76) It should be noted that these studies explored interventions for a range of conditions in a large, heterogeneous group of participants, but together, they demonstrate that many of the advantages of group-based and virtual delivery are combined in a virtual group.

Some disadvantages of virtual group interventions have also been suggested. For instance, participants have expressed that social interactions within virtual group interventions are not the same as within in-person interventions, because of the virtual delivery.(75) Some participants have suggested that group dynamics are less positive in virtual groups, partly because of the reduced ability of participants to chat informally during sessions.(75) Similarly to individual virtual interventions, there are also concerns that this format is not suitable for everyone, with some individuals lacking the capacity or motivation to engage digitally.(75,77) One hesitant participant of a virtual group for older adults commented that they felt they had no need to increase their comfort with technology.(75) Some technical features of virtual groups have also been deemed as distracting by participants, such as text-based messaging features, which some participants may find difficult to ignore.(72,76) In addition, some participants are put off by the group setting of these interventions, feeling instead

that they would be more comfortable in individual interventions.(77) These findings demonstrate that despite the relatively novel nature of these interventions, virtual groups possess similar disadvantages to individual interventions delivered virtually, and in-person interventions in a group setting. Exploring these disadvantages in more detail is an important way to understand how they can be mitigated in order to optimise virtual group interventions.

Many further important unknowns remain surrounding virtual group interventions. On a basic level, the extent to which these interventions have been used for different conditions, and the healthcare-related contexts in which they have been used, remains unclear. Furthermore, it is unclear how interventions for different physical conditions are experienced by participants and facilitators. Little is known about for whom these interventions work best, and what specific attributes of virtual group interventions lead to positive experiences for participants and facilitators. It is also unclear whether, and to what extent, the important interpersonal behaviour change processes observed in in-person group interventions are sustained in a virtual setting. Because of the aforementioned social changes that take place when a group meets virtually, compared to in-person, it is likely that some group-based change processes will be altered with virtual delivery.(78) For instance, if participants don't feel as connected to their fellow group members compared to an in-person group, they may be less likely to share advice and experiences with others, which is an important group-based behaviour change process.(29)

With the use of virtual interventions in healthcare increasing, and the healthcare system in the UK under increasing strain, virtual group interventions for preventing or managing chronic physical conditions are an important delivery mode for investigation. Gaining a deeper understanding of where and how they have been used to date, and perceived advantages and disadvantages of these interventions, will inform recommendations for their future use.

1.5: Thesis aims and approach

To address the gaps in the evidence outlined above, the overall aim of the projects in this thesis was to explore the benefits and drawbacks of virtual group interventions to prevent or manage chronic physical conditions. Specifically, this

was explored in relation to participant and facilitator engagement with and experiences of virtual group interventions. Two complementary studies helped to achieve this aim.

Study 1 was a mixed-methods systematic review of the existing literature surrounding virtual group interventions for preventing and managing common chronic physical conditions. It asked the questions:

1. How do adults engage with virtual group interventions which aim to improve prevention or management of common chronic physical conditions in primary care and community settings?
2. How are these virtual group interventions experienced by participants?

Expanding and building on this systematic review, the second study used qualitative interviews to explore how virtual group interventions are experienced by participants and facilitators. Participants and facilitators of various virtual groups, including a group supporting parent carers, and a virtually-delivered arm of the group-based NHS Diabetes Prevention Programme, took part in individual semi-structured interviews which explored in detail their experiences of this type of intervention delivery. This study asked the questions:

1. How are virtual group-based healthcare interventions experienced by adult participants and facilitators?
2. What are the perceived behaviour change mechanisms taking place in virtual group-based health interventions?
3. Based on these experiences, how can virtual group health interventions be better designed and delivered to optimise accessibility and behaviour change in the future?

Use of Patient and Public Involvement

Patient and Public Involvement (PPI) groups were consulted several times during both of the studies presented in this thesis. In all cases, meetings were held virtually and group members had experiences of chronic physical conditions. The reason that PPI groups were consulted was to ensure that the aims and objectives of the research were clear and relevant to those in the groups, as well

as to ensure that the findings were also pertinent and communicated in a meaningful way. For further detail, see sections 2.2.9: Public and Patient Involvement, and 3.2.2: Public and Patient Involvement.

1.6: Structure of thesis

The next chapter discusses the mixed-methods systematic review exploring existing literature on virtual group interventions. Chapter 3 then reports on the qualitative study, which explored the experiences of participants and facilitators of virtual group interventions. Chapter 4 presents a general discussion of the results reported in these studies, bringing both studies together to contextualise them within the existing literature, as well as discussing strengths and limitations of the overall approach of this thesis. This chapter ends with some concluding remarks for the overall thesis, presenting final reflections from both studies, and suggestions for the direction of future research.

Chapter 2: Participant engagement with and experiences of virtual group interventions in primary and community care for adults with, and at risk of developing, common chronic physical conditions: a mixed-methods systematic review

2.1: Background

This chapter describes a mixed-methods systematic review aiming to explore participants' engagement with, and experiences of, virtual group interventions. Given the importance of researching virtual group interventions in healthcare outlined in detail in **Chapter 1: Introduction**, the current review fills an important gap in the research. There has been an increase in primary research into these alternative delivery formats in recent years, especially during the Covid-19 pandemic, and to the authors' knowledge, there has thus far been no systematic review of research on how participants engage with and experience this type of intervention for preventing and managing chronic conditions commonly seen in primary care and community settings.

This review therefore aimed to explore participant engagement with, and experiences of, virtual group interventions for the prevention and management of common chronic physical health conditions in primary care and community settings, alongside describing the literature discussing current evidence for the provision of virtual group interventions, including where virtual group interventions have been used and for which conditions. Here, engagement is defined as the desire and capability to choose to take part in an intervention, as indicated by quantitative measures such as attendance and attrition, as well as qualitative data including any barriers or facilitators to engagement.(79) As outlined in detail in **Chapter 1: Introduction**, it is important to review how and where these interventions have been used and the different ways in which participants engage with and experience these types of interventions, in order to optimise their future use in primary care, including ensuring providers feel confident to deliver care in this format.

This review builds on the review work conducted by Banbury *et al.* in 2018 on videoconferencing for support groups,(57) as well as an ongoing systematic review by Scott *et al.* (80). The latter focusses on group *consultations*, rather than multi-session behaviour change-oriented interventions, which is the specific

focus here. The reported review therefore builds on, extends, and updates these existing works by including literature published before, during and shortly after the initial peaks of the Covid-19 pandemic; by discussing multi-visit group virtual interventions for behaviour change, rather than group consultations; and through specifically focusing on participants' engagement with and experiences of these interventions.

2.1.1: Research questions

1. How do adults engage with virtual group interventions which aim to improve prevention or management of common chronic physical conditions in primary care and community settings – what factors influence their engagement? *This will be addressed by looking at attendance and attrition data, as well as qualitative data from participants on facilitators or barriers to engagement*
2. How are these virtual group interventions experienced by participants? *This will be addressed by looking at thoughts, feelings, opinions, and perceived outcomes expressed by participants*

2.2: Methods

Many different factors are likely to interact to influence a participant's overall engagement with and experience of an intervention, and this has been reflected in the use of a mixed methods approach to conducting this systematic review. This approach allows for the identification and integration of valuable qualitative and quantitative data, bringing together findings covering areas such as participants' responses to interviews, and participant attrition statistics.(81) See **Table 1** for information about researcher contributions to this systematic review.

Task	**Researcher contributions**
Conducting scoping searches	CR
Writing protocol, gaining PROSPERO registration	CR, AB, JRS
Running final searches	CR
Title and abstract screening	CR*, EC, SM, LH, JRS
Full text screening	CR*, EC, SM, JRS
Data extraction	CR
Data extraction reviewing	CR, EC, SM, JRS
Methodological quality assessment	CR
Methodological quality assessment reviewing	CR, EC, SM, JRS
Data analysis	CR
Write-up	CR
Reviewing write-up	CR, AB, JRS

CR: Ms Charlotte Reburn; EC: Dr Emma Cockcroft; SM: Dr Sinéad McDonagh; LH: Ms Laura Hollands; AB: Dr Aleksandra Borek; JRS: Dr Jane R Smith. CR contributed to the reviews of EC, SM, and LH. AB and JRS are supervisors of CR.

*CR screened 100% of papers at both screening stages.

Table 1: Researcher contributions to this systematic review

2.2.1: Protocol and registration

The protocol for this systematic review was registered on PROSPERO (https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=325804), and has been reported in accordance with Preferred Reporting Items for Systematic Review Analyses (PRISMA) guidelines (see **Figure 1**).

2.2.2: Eligibility criteria

Inclusion criteria

Population: Adults aged 18 or over with or at risk of one or more non-communicable chronic physical condition (as identified using any recognised criteria or definition) which is primarily treated in primary care and can be largely prevented or effectively managed through changing lifestyle and/or self-management behaviours. For the purposes of this review, a chronic condition was defined using an adaptation of the definition from Friedman *et al.,* (2008), in that it 1) places limitations on self-care, independent living, and/or social interactions; and 2) it results in the need for ongoing medical intervention or special equipment.(82)

Intervention: Virtual group interventions led from primary or community care settings. These were defined in this review as comprising at least two consecutive sessions led by a trained facilitator over videoconferencing software (e.g., Zoom, Microsoft Teams), where participants are in different locations to one another, and can communicate with each other and the facilitator in real-time. This is to distinguish these sessions from one-off group consultations and reviews, which focus less on long-term behaviour change and education.

Types of study: There were no restrictions on the types of primary study design eligible for inclusion in this review. This is because scoping searches suggested that there would be a high degree of methodological heterogeneity within the search results.

Exclusion criteria

Population: Children and adolescents aged under 18; adults treated mainly outside of primary care, for example those in specialist secondary or tertiary care

services; as well as adults who are solely being treated for the prevention and management of mental health or cognition-related conditions.

Intervention: Those taking place/led out of secondary or tertiary care; audio-only teleconference calls; individual videoconference calls where there is only one participant present; text-only or asynchronous virtual interventions, including mobile apps and websites; or in-person group interventions.

There were no restrictions on comparators for this review, due to the anticipated heterogeneity of studies to be included.

Types of study: All secondary study designs were excluded, including systematic reviews, meta-analyses, and literature reviews. Due to the authors only speaking English, studies unavailable in English were also excluded.

2.2.3: Information sources

The following databases were searched in June 2022: MEDLINE, Embase, and American Psychological Association (APA) PsycINFO via OVID, and Cumulative Index to Nursing and Allied Health Literature (CINAHL) via EBSCO.

2.2.4: Search strategy

This search strategy was developed after ten iterations of scoping searches, and is a result of consultations with information specialists, the rest of the research team and a Public and Patient Involvement (PPI) group. The PPI group were consulted during a group video call where they reflected on the pertinence and clarity of the different search categories, and how they would eventually relate to the questions and findings of the research (for further detail, see section 2.2.9: Public and Patient Involvement). During the search strategy development process, key words and terms were defined, with the help of the research team, and relevant existing systematic reviews.(29,57) Free text and Medical Subject Headings (MeSH) index terms were used, and in some cases combined with proximity indicators. Searches were adapted for each database, using index terms that were specific to that database where available. Due to the anticipated small number of studies focusing on this topic, the Population, Intervention,

Comparator and Outcome (PICO) format of searching was not used, because comparators and outcomes were not searched for. Instead, the search contained blocks of terms related to four concepts: 1) chronic physical conditions, 2) prevention or management interventions, 3) group interventions, and 4) virtual interventions.

The first section of the search related to chronic physical conditions, and contained terms such as ‘diabet*’, ‘cardiovascular disease’, and obesity. Chronic condition search terms were informed by past systematic reviews into chronic condition management in primary care, as well as personal communication with clinicians.(83,84) The second section of the search related to the intervention content, and included terms such as ‘health literacy’, ‘health promotion’, and ‘self-management’. Thirdly, the group element of the intervention was included in the search, using terms such as ‘shared medical appointment’ and ‘group intervention’. Some group-related search terms were based on a section of the search strategy from Borek *et al.,* 2018, which was a review of group-based interventions for weight loss.(16) Finally, terms were included to denote that these interventions were to be conducted virtually, such as ‘virtual’ or ‘teleconferenc*’. Some technology-related search terms were based on a previously published search filter from the work of Banbury *et al.,* 2018, which is a review of virtual groups for older adults managing chronic conditions.(57) As an example, for the full search strategy used in Medline, see **Table 2**.

#	**Query**
1	(Diabet* or 'chronic pain' or asthma* or obesity or obese or 'weight loss' or 'weight management' or overweight or diet or 'chronic disease*' or 'chronic condition*' or 'chronic illness*' or 'long term disease*' or 'long term condition*' or 'long term illness*' or COPD or 'chronic obstructive pulmonary disorder' or angina or hypertension or 'high blood pressure' or arthritis or dermatitis or prediabetes or 'pre-diabetes' or hyperglycaemia or hyperglycemia or cholesterol or 'cardiovascular disease' or CVD or smoking).af.
2	Diabetes Mellitus/
3	Chronic pain/
4	Asthma/

5	Obesity/
6	Weight loss/
7	Chronic disease/
8	Pulmonary Disease, Chronic Obstructive/
9	Angina Pectoris/
10	Hypertension/
11	Arthritis/
12	Dermatitis/
13	Prediabetic State/
14	Hyperglycemia/
15	Hypercholesterolemia/
16	Cardiovascular Diseases/
17	Smoking/
18	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17
19	adult.af.
20	18 and 19
21	(manage* or 'Self management' or 'Self-management' or care or 'health education' or 'telerehabilitation' or prevent* or 'health promotion').af.
22	Health Literacy/
23	Self Care/
24	Patient Education as Topic/
25	Health Education/
26	Telerehabilitation/
27	Rehabilitation/
28	Health Promotion/
29	21 or 22 or 23 or 24 or 25 or 26 or 27 or 28
30	20 and 29

31	('Shared medical appointment*' or 'group consultation*' or 'group-based' or 'group intervention*' or (group adj3 program*) or 'group appointment*' or 'group visit*' or (group adj3 education) or (group adj3 session*) or 'group setting*' or (group adj3 deliver*) or 'weight loss group*' or (group* adj3 implemented) or (group adj3 format*) or 'group versus individual' or 'group vs individual').af.
32	''Referral and Consultation''/
33	Shared Medical Appointments/
34	Group Processes/
35	31 or 32 or 33 or 34
36	20 and 29 and 35
37	(virtual* or remote* or video or web-based or 'web based' or Zoom or 'Microsoft Teams' or 'tele-conferenc*' or teleconferenc* or videoconferenc* or telehealth or internet or online).af.
38	Telemedicine/
39	Videoconferencing/
40	Remote Consultation/
41	37 or 38 or 39 or 40
42	20 and 29 and 35 and 41
43	limit 42 to English language

'/' at the end of a term indicates it is a MeSH term.

Table 2: Example Search in Medline

2.2.5: Study selection

After searching, records were uploaded and de-duplicated using the software Covidence (Veritas Health Innovation). Double screening of titles and abstracts was undertaken, with CR screening all, and second screening shared amongst four other reviewers, with any conflicts discussed between reviewers, and a third reviewer consulted as necessary. Full texts were also double-screened, with any conflicts being referred to a third reviewer as necessary. At both screening stages, reviewers were blind to other reviewers' decisions. Conflicts were flagged and discussed at both screening stages, with an ongoing dialogue between

researchers to ensure consistency regarding understanding of established inclusion and exclusion criteria. See **Table 1** for all researcher contributions to screening.

An exclusion hierarchy was utilised for classifying reasons for excluding full texts in this review (see **Table 3**), based on reasons for exclusion, ordered by importance. When multiple reasons for exclusion applied to a paper at full-text stage, the final reason given was the most important reason according to the exclusion hierarchy. This process was utilised to minimise inter-reviewer conflicts over reasons for exclusion at the full-text stage.

Number	Reason for exclusion
1	Not in English
2	Conference abstract
3	Paediatric population
4	Wrong intervention
5	Wrong participant population (adult participants)
6	Wrong outcomes
7	Wrong setting
8	Wrong study design
9	Review, no relevant references found

Table 3: Exclusion hierarchy used to guide and document reasons for exclusion of studies

2.2.6: Data extraction

Data was extracted by one reviewer (CR), recorded in a Microsoft Excel spreadsheet designed for the purpose of this review, and checked by a second, with any conflicts being discussed with a third reviewer as necessary. Key study and population characteristics were extracted, including study type, date of study, participant demographics and their risk factors or chronic condition, and setting. Key characteristics of the intervention were also extracted, including number of sessions, duration of sessions, aim of sessions, group size, and facilitator type. The nature of any comparators was also extracted, where applicable. The content of the data extraction table was guided by previous studies of group interventions, and was adapted iteratively according to the data, to ensure all relevant findings were captured.(16,57)

Additionally, any qualitative and quantitative findings regarding participant engagement and experiences were extracted. This included participant quotes, author interpretations, and themes, as well as attrition rates, attendance rates, and questionnaire summary scores.

2.2.7: Data synthesis

The *convergent integrated* approach to mixed-methods synthesis was utilised in this systematic review.(81) This is where qualitative and quantitative data are analysed separately, and then integrated. This integration involved thematic synthesis of the qualitative data, and 'transforming' of quantitative data into qualitative themes, and integrating the themes in thematic synthesis. This helped to provide a fuller understanding of participant engagement and experiences. This process was undertaken by one reviewer (CR) and reviewed by the other members of the review team, to help with theme development.

Step 1: Extraction

Thematic synthesis was informed by the findings on participant engagement and experience that were extracted for each paper, and the themes were generated from the data itself rather than through an external framework.(81) This took place iteratively in Microsoft Excel as well as through using printed snippets of themes that were moved around and organised physically by CR. See **Appendix 8: Samples of original synthesis process – engagement** for samples of the original printed datasets for engagement to illustrate this synthesis process further.

Step 2: Initial coding

To begin the synthesis process, extracted data from each included paper was read and re-read, to gain a thorough understanding of the findings from each paper. Data was extracted separately for participant engagement and participant experience, and so initial coding was also undertaken separately for these findings. Any instances of these findings applying to specific population groups were identified through separate coding and was split into a separate column, to

result in two separate columns – one of general findings, and one of findings relating to specific population groups.

Step 3: Refining and reorganising themes and subthemes

Following this,, once an initial coding schema had been formed, and initial themes had been created, extracted data was re-read and themes were refined and reorganised into main themes and subthemes. This was for participant engagement and experience, pertaining to both general findings and findings that were specific to a particular population group. At this stage, themes generated based on quantitative data were integrated into the themes generated based on qualitative data. This took place on an individual study basis, and involved converting key quantitative data points (e.g., an attendance rate of 95%) into qualitative findings (e.g., high overall attendance) to be integrated into thematic synthesis.

Step 4: Final refining of themes

Once these separate themes and sub-themes for engagement and experience had been refined, they were once again revised in order to produce one set of five themes covering both engagement and experience, because some themes overlapped between engagement and experience.

2.2.8: Methodological quality assessment

Quality assessment was conducted by one reviewer and checked by a second, during the in-depth data extraction stage of this review. Any discrepancies were resolved by discussion between two reviewers, with reference to a third researcher when necessary (see **Table 1**). Studies were not excluded based on their assessed quality, but the results of this assessment were taken into consideration narratively in the data synthesis.

For qualitative studies, the Critical Appraisal Skills Programme (CASP) Qualitative Studies Checklist was used to assess elements including rigour of analysis, appropriateness of methodology, and clarity of findings.(85) For

quantitative studies, two risk of bias tools were used as appropriate: the Cochrane Risk of Bias 2 (RoB 2) Tool was used for any randomised controlled trials,(86) to evaluate methods of randomisation, blinding, and treatment allocation. The Risk Of Bias In Non-randomised Studies - of Interventions (ROBINS-I) tool was used to appraise any non-randomised pilot studies or feasibility studies included in the final review.(87)

For any mixed-methods primary studies, the Mixed-Methods Appraisal Tool (MMAT) was used.(88) For qualitative elements of these studies, this tool evaluated elements including appropriateness of qualitative methodology for the research question, and interpretation of findings. For quantitative elements of these studies, this evaluated elements including intervention fidelity.

Sensitivity analysis was not performed in this review, due to its mixed-methods nature and the subsequent lack of quantitative synthesis.

2.2.9: Public and patient involvement

Two Patient and Public Involvement (PPI) meetings were held with contributors from the Exeter Collaboration for Academic Primary Care (APEx) PPI group at the University of Exeter. These meetings were organised by the PPI coordinator for the research group, and this group regularly contribute to PPI work within the group. The group consisted of four to five contributors on each occasion, to discuss the review. In the first session, at the beginning of the systematic review process, participants were asked, in reference to the research question: "*What are the experiences of and engagement with virtual shared medical appointments in adults with chronic physical conditions?*":

(a) *Is this a clear question?*

(b) *What are the important issues that you think patients would want to see researched in this area*?

(c) *What's important to you in this area of primary care?*

(d) *Does this cover every relevant angle that you'd like to see covered for this issue?*

(e) *Is there anything you'd change about the question?*

(f) *Is the question too broad?*

In this first session, provisional search terms were read by the group (as previously discussed in this chapter), and questions were refined in order to increase their conciseness and clarity. Participants shared both their lived experiences of engaging with group-based healthcare interventions, virtual healthcare interventions, and what they would desire to see in a virtual group intervention, based on their experiences. Participants also shared their thoughts on what makes an excellent facilitator as well as perceived barriers to engaging with virtual group sessions.

During the data synthesis phase, the PPI group were consulted again, in a second session, to ensure that the proposed themes generated were relevant to the data, were clear and logical, and aligned with the questions that were agreed on at the start of the review process. Specifically, participants were asked:

(a) Are the themes clear?

(b) Are the themes logical?

(c) Are the themes relevant?

These questions were asked whilst the researcher took participants through a PowerPoint presentation, alongside an accompanying PDF with a summary of each theme, which was sent to participants in advance of the session. The themes were discussed in detail, and ideas were clarified by the researcher when participants fed back that themes weren't concise or clear. The researcher kept detailed notes of the opinions of the participants pertaining to each theme, as well as any insights or questions that were asked. Some changes were made as a result of this consultation (see **2.3: Results**, below). Both PPI meetings were held virtually, over Microsoft Teams videoconferencing software. Both meetings took place with the same PPI contributors, meaning they were familiar with the project in the second meeting.

2.3: Results

Of the 7256 references initially identified, 6659 remained after removing duplicates (see **Figure 1**). Following title and abstract screening 207 papers were selected for full-text review. Common reasons for exclusion at this stage were a

clear focus on the wrong population, such as a paediatric population, or on the wrong type of intervention, such as an in-person intervention. 188 of these papers did not meet the criteria for inclusion, so were excluded. The most common reason for exclusion at the full text stage was wrong intervention (n = 114 papers). For a list of full texts excluded and the reasons for exclusion, see Appendix 9: Reasons for exclusion at full text screening stage. After full text screening, 19 papers were selected for inclusion in the review, focusing on 17 interventions, as one intervention was the subject of three papers.(58,89,90) These 19 papers focused on weight management, type 1 and 2 diabetes, and multiple chronic physical conditions. Study types included six randomised controlled studies,(58,59,61,91–93) three mixed-method studies,(94–96) three feasibility studies,(68,90,97) three qualitative studies,(69,98,99) three prospective cohort studies,(100–102) and one preliminary prospective open-label pilot study (60).

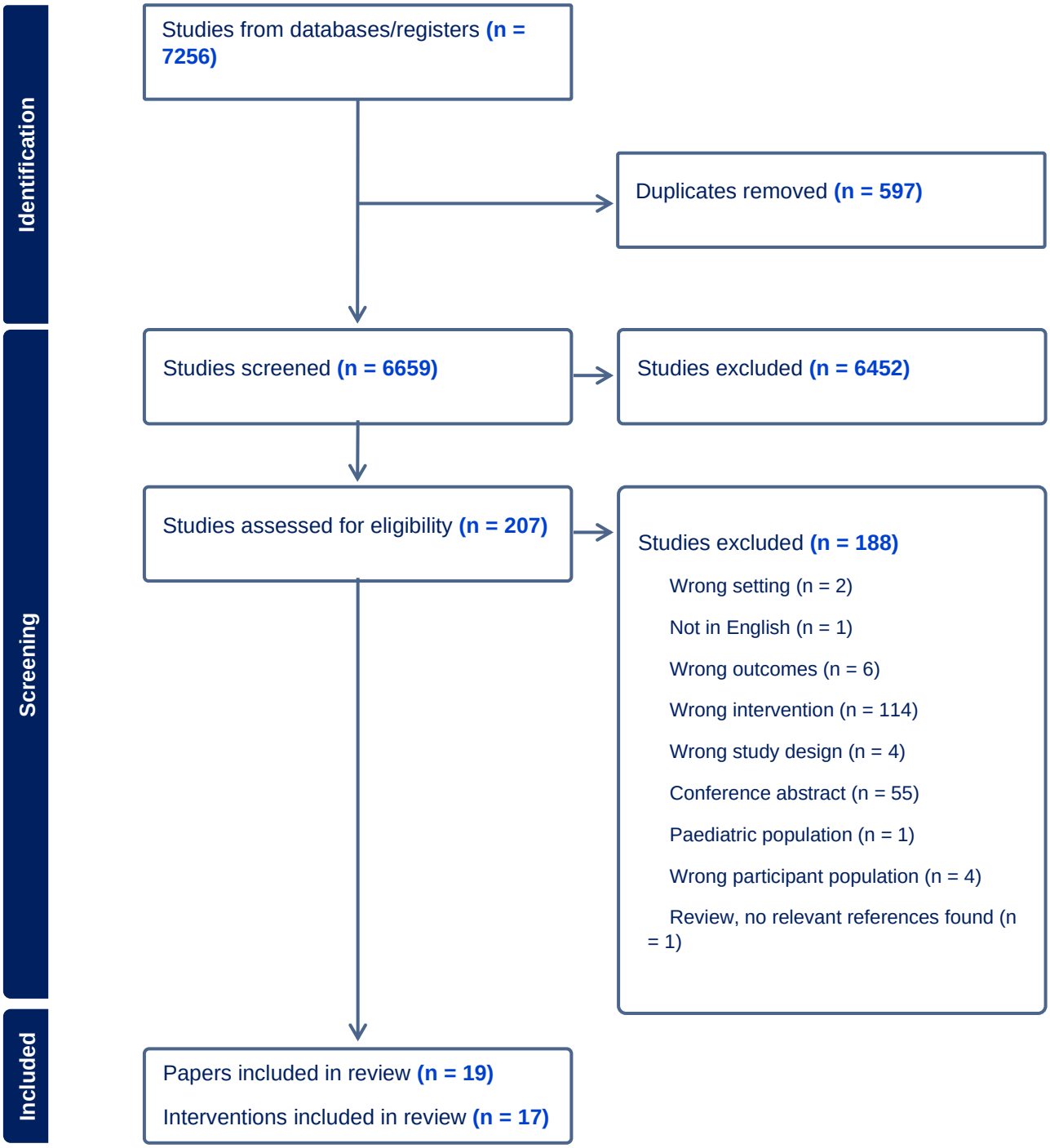


Figure 1: PRISMA diagram demonstrating the process by which studies were excluded from this review, and numbers included and excluded at each stage.

2.3.1: Characteristics of included studies

See **Table 4** and **Table 5** for a full breakdown of key characteristics of included studies. All 17 included studies took place between 2009 and 2022. The majority of studies were conducted in the USA (n = 9),(58–61,68,89–93,95) with three studies based in the UK,(69,98,100) two in Australia,(94,96) and one each in

Canada,(99) Norway,(97) and Portugal.(102) The most common focus of included studies was weight management, with six studies focusing on obesity,(59,61,69,92,95,100) and one focusing on overweight and obesity.(93) Three studies focused on management of type 1 diabetes,(58,89,90) and two on prevention of type 2 diabetes.(68,91) Three studies focused on a range of chronic physical conditions within their interventions,(94,97,99) and one study each focused on chronic pain,(60) COPD,(98) heart failure,(96) and cardiovascular conditions.(102) Sixteen studies focused on management of chronic physical conditions,(58–61,69,89,90,92–94,96–100,102) with the remainder focused on prevention,(68,95) and one reporting on a combined prevention and management approach.(91)

Intervention duration ranged from five weeks (94) to twelve months (58,89,90,92,93), with one ongoing intervention having no end point.(98) Total participant sample sizes ranged from 8 to 239, and the mean participant age was 47.63 years, based on the 16 studies from which this figure could be calculated. One study was male-only,(59) and three studies were female-only.(61,68,95) In mixed-gender studies, the proportion of women ranged from 12% to 98%. Thirteen of the 19 studies reported race or ethnicity of their participants.(58–61,69,89–93,95,96,100) Of these studies, 12 consisted of a majority of White participants, and one study had a majority (72%) of non-White participants.(92) Socioeconomic status (SES) was reported by 12 of the 19 papers.(58,59,61,68,69,89,90,92–95,100). SES indicators reported included mean household income, type of health insurance, education level, and deprivation quintile. SES markers were mixed throughout the papers, and more detail can be found in **Table 4.** As per the eligibility criteria, all studies used videoconferencing software to provide synchronous group video calls as the format for session delivery.

2.3.2: Methodological quality assessment

Of the 19 papers, six were quality assessed using the RoB 2 tool, six using ROBINS-I, four using CASP, and three using MMAT. Overall, 12 of the 19 papers were assessed as having high overall quality (no methodological concerns identified), six of the studies were assessed as having moderate overall quality

(some methodological concerns),(58,59,61,94,95,102) and one of the 19 studies was assessed as having low overall quality (high methodological concerns).(99)

Of the studies that were of some/high concern, the most frequently occurring methodological concerns were a lack of representative samples due to self-selection, a lack of rigorous reporting of qualitative methodology, and lack of information on allocation sequence concealment in randomised controlled trials.

Study	Study design	Condition	Number of Participants	Mean participant age	% female (intervention group)	% White (intervention group)	Participant SES	Methodological quality
Abbott, 2021	Prospective cross-sectional study	Obesity	227	44	70%	67%	60% most deprived quintile	No concerns
Azar, 2015	Randomised controlled pilot study	Obesity	64	47	0%	74%	72% college education or above	Some concerns
Azar, 2016	Randomised controlled trial	Type 2 diabetes and/or CVD	74	60	60%	84%	N/A	No concerns
Bakhach, 2019	Prospective cohort pilot study	Type 1 diabetes	81	20	55%	86%	86% private insurance	No concerns
Banbury, 2020	Mixed, methods, quasi-experimental trial	Chronic conditions	139	73	53%	N/A	53% private insurance	Some concerns
Bisno, 2021	Randomised controlled trial	Type 1 diabetes	58	21	61%	82%	87% private insurance	Some concerns
Burkow, 2013	Qualitative feasibility study	Severe COPD OR type 2 diabetes	5 (diabetes), 5 (COPD)	40 - 74*	50%	N/A	N/A	No concerns
Cliffe, 2021	Qualitative study	Obesity	13	18- 60+*	62%	100%	46% 4th quintile (less deprived)	No concerns
Das, 2021	Randomised controlled trial	Overweight/obesity	239	41	98%	77%	40% household income under $59,999	No concerns
Ehlers, 2015	Mixed-methods case study	Obesity	30	45	100%	73%	68% household income over $40,000	Some concerns
Hwang, 2017	Mixed-methods study	Heart failure	17	69	12%	88%	N/A	No concerns
Lewis, 2022	Qualitative study	COPD	8	N/A	75%	N/A	N/A	No concerns
Mariano, 2021	Preliminary, prospective, open-label pilot study	Chronic pain	47	55	70%	72%	N/A	No concerns
Marziali, 2009	Qualitative pilot study	Chronic disease	18	61	83%	N/A	N/A	High concerns
Pinto, 2022	Prospective cohort study	Cardiovascular disease	116	63	16%	N/A	N/A	Some concerns
Reid, 2018	Feasibility study	Type 1 diabetes	42	20	55%	83%	86% private insurance	No concerns
Shell, 2020	Randomised controlled trial	Obesity	150	53	91%	28%	Mean household income: £17,538	No concerns
Taetzsch, 2019	Feasibility study	Type 2 diabetes	43	42	100%	N/A	69% household income over $80,000	No concerns
West, 2019	Randomised controlled pilot study	Obesity	32	48	100%	81%	75% college education or above	Some concerns

*Age range, as mean wasn't reported

Table 4: Key characteristics of included studies

Study author	Condition	Prevention (P) or management (M)	Duration of sessions	Number of sessions	Frequency of sessions	Duration of intervention	Focus of sessions
Abbott, 2021	Obesity	M	1 hr	6	Monthly	6 months	Course of structured patient education, and self-management group sessions (no further details)
Azar, 2015	Obesity	M	Not stated	12	Weekly	12 weeks	Based on the US Diabetes Prevention Program,(103) plus Wi-Fi smart scales for weekly weighing
Azar, 2016	Type 2 diabetes and/or cardio-vascular disease	P and M	Not stated	24 + 7 in-person exercise sessions	Weekly	6 months	Stress management, behavioural lifestyle elements, and physical activity. Participants had 'Fitbits' and wireless scales.
Bakhach 2019	Type 1 diabetes	M	30 mins	3 virtual + 1 in-person	1 visit every 3 months	12 months	Personal introductions, diabetes in the workplace, self-advocacy, and stress management.
Banbury, 2020	Chronic conditions	M	Not stated	5	Weekly	5 weeks	Different aspects of health literacy and chronic disease self-management.
Bisno, 2021	Type 1 diabetes	M	30 mins	3 virtual + 1 in-person	1 visit every 3 months	12 months	Sessions were designed to address psychosocial needs of participants. Topics included alcohol and drug use, stress, and support systems.
Burkow 2013	Severe COPD OR type 2 diabetes	M	Not stated	6	Weekly	6 weeks	Respiratory: Group education sessions focused on general themes in COPD as well as specific themes, such as oxygen use while travelling. Diabetes: educational group sessions focused on diabetes self-management

Study author	Condition	Prevention (P) or management (M)	Duration of sessions	Number of sessions	Frequency of sessions	Duration of intervention	Focus of sessions
Cliffe, 2021	Obesity	M	Not stated	8 + 2 one-off review sessions	Weekly for first 8 weeks, 2 one-off review sessions	8 weeks, with review sessions at 4 and 6 months	Different aspects of weight management, including education on healthy eating and physical activity.
Das, 2021	Overweight/ obesity	M	1 hr	26	Weekly until 16 weeks, biweekly to 24 weeks, and monthly thereafter	12 months	One strand: participants and leaders agree on daily goals for energy/fat intakes and physical activity, in order to reach 0.5-1.0 kg/wk. Second strand: uses a revised interpretation of social cognitive theory, focusing on managing hunger and increasing intrinsic motivation.
Ehlers, 2015	Obesity	P	1 hr	12	Weekly	12 weeks	Targeted lifestyle and physical activity using books as platforms for group discussions targeting social cognitive theory and self-worth.
Hwang, 2017	Heart failure	M	Not stated	24	Biweekly	12 weeks	Discussion of educational topics, including self-management, nutritional and physical activity counselling, and medications.
Lewis, 2022	COPD	M	1 hr	No end point	Weekly	Ongoing - no end point	Warm-up exercises and performing different songs on the harmonica appropriate for individuals who may become breathless.
Mariano 2021	Chronic pain	M	2 hrs	8	Weekly	8 weeks	Goal setting and review of goals, presentation of information and skills for pain management, live training in relaxation exercises, group discussion.

Study author	Condition	Prevention (P) or management (M)	Duration of sessions	Number of sessions	Frequency of sessions	Duration of intervention	Focus of sessions
Marziali 2009	Chronic disease	M	1 hr	22	Weekly	5.5 months	Aiming to understand emotional responses to diagnosis, barriers to implementing medication regimes, significant lifestyle changes, and enhancing self-efficacy and control.
Pinto, 2022	Cardiovascular disease	M	Not stated	7 (3 exercise, 1 educational, 3 psychological)	Monthly exercise, monthly psychological	3 months	Psychological group support sessions included online support and relaxation sessions.
Reid, 2018	Type 1 diabetes	M	20-30 mins	3 virtual + 1 in-person	1 visit every 3 months	12 months	Stress management, building social support, self-advocacy and efficacy, and using diabetes technology. Participant-led discussion.
Shell, 2020	Obesity	M	20 min discussions/lessons, 30-45 mins physical activity	54	Twice-weekly up to 20 weeks, weekly in weeks 21 to 23, every other week in weeks 24 to 39, monthly in weeks 40 to 52.	12 months	Sessions consisted of nutrition lessons/discussions and 30–45 min of physical activity.

Study author	Condition	Prevention (P) or management (M)	Duration of sessions	Number of sessions	Frequency of sessions	Duration of intervention	Focus of sessions
Taetzsch 2019	Type 2 diabetes	P	Not stated	12	Weekly	12 weeks	Official community-adapted version of the US Diabetes Prevention Program.(103)
West, 2019	Obesity	M	1 hr	24	Weekly	6 months	Restricting calorie intake and increasing physical activity using self-management skills, such as self-monitoring, goal setting, problem-solving, and relapse prevention.

Table 5: Intervention characteristics in included studies

2.3.3: Synthesis of key themes

Engagement and experience findings were derived from a range of sources in included studies. For seven studies, findings related to engagement and experience were derived from attendance figures,(58,59,61,68,89,92,93,102) and two studies combined these attendance figures with a satisfaction survey.(91,100) Six studies featured semi-structured interviews,(47,69,94,95,97,99) and one study combined these with a survey.(96) In two studies findings were derived solely from participant surveys.(60,90)

Across the 19 papers reporting on 17 interventions, five key themes were generated that pertained to participant engagement with, and experiences of, virtual group interventions for preventing and managing chronic physical conditions, each with several subthemes. The final overarching themes were: **1)** attendance and dropout rates; **2)** barriers to attending/engaging with sessions; **3)** experiences of using virtual group technology; **4)** experiences of intervention features; and **5)** experiences of group interactions. See **Table 6** for an overview of the five themes and their corresponding subthemes, which are discussed in more detail in the following sections. To see these themes summarised in a poster, see **Appendix 7: Poster entered into the Doctoral College's poster competition, June 2023, and the School for Primary Care Research's Showcase Event, September 2023**.

Key themes	Subthemes
Attendance and dropout rates	
	Session attendance in intervention groups
	Differences in attendance, attrition and engagement between intervention and comparator groups
	Dropout rates (after enrolling)
	Engagement and personal characteristics
Barriers to attending/engaging with sessions	
	Reasons for not attending sessions
	Barriers to accessing programmes remotely
	Technical problems during sessions
Experiences of using virtual group technology	
	Comparing experiences of virtual and face-to-face groups
	Experiences of new technology users
Experiences of intervention features	
	Comments about the intervention as a whole
	Experiences of specific intervention features
	Participant-reported outcomes
Experiences of group interactions	
	The value of interacting with other group members
	Positive group dynamics
	Activities relating to positive group dynamics
	Social limitations of virtual groups

Table 6: The five themes and their related subthemes

2.3.3.1: Attendance and dropout rates

Session attendance in intervention groups

In three studies focusing on weight management, type 1 diabetes management in young adults, and chronic condition management in older adults, interventions had an average attendance of over 75% of sessions.(58,59,94) In two out of these three interventions, participants were loaned IT equipment.(59,94)

Not all studies had such high attendance rates. Two weight management studies had an average attendance rate of between 50% and 75%.(61,95) Two other studies, focusing on weight management and chronic pain, had small groups of participants with very low attendance.(59,60) Another two, focused on weight management and cardiac rehabilitation, had an average attendance rate of under 50% of intervention sessions.(92,102)

Some studies observed variation of attendance within groups across different sessions. In two cardiac rehabilitation studies, session content was associated with varying attendance: webinars on nutrition and stress management were the most highly attended.(91,102)

Differences in attendance, attrition and engagement between intervention and comparator groups

Six studies examined differences in attendance between virtual group interventions and (non-virtual) comparator groups including a text-based website and in-person groups. In five studies, it was found that intervention participants attended more sessions, on average, than comparator participants.(58,60,61,89,90) However, this finding was not universal amongst included studies; comparator group participants taking part in a face-to-face version of the same weight management intervention attended more sessions than intervention participants in one study.(95)

Attrition was also compared between intervention and comparator groups and found to be lower in virtual intervention groups when compared to delayed intervention,(59) in-person groups,(60,68) and text-based(61) comparator groups

in four included studies.(59–61,68) However, attrition was higher in virtual intervention groups compared to the comparator groups of two studies, consisting of a delayed intervention group and an in-person group.(91,95)

The way that comparator and intervention participants engaged with different behaviours related to the interventions was also examined in three studies. Two of these reported that intervention participants engaged more with the intervention or self-management behaviours than control groups.(61,90) In one of these studies, focused on weight management, it was found that intervention group participants were more likely to engage with online material related to the intervention outside of sessions, suggesting greater engagement.(61) Similarly, in a study focusing on type 1 diabetes management in young adults (aged 18-25), intervention participants submitted more HbA1c tests than the comparator group.(90)

Dropout rates (after enrolling)

Rates of non-completion of the intervention (dropout rates) were explored in 11 studies.(59–61,68,69,91–93,95,97,102) Overall, dropout during the intervention in included studies, before follow-up periods, was under 25% in eight studies.(59–61,68,93,95,97,102) Contrastingly, two studies, both focusing on obesity management, had a dropout rate during the intervention of over 25%.(69,92) Dropout rate at follow-up was under 25% for two studies that measured this, which focused on chronic pain management and general chronic disease management.(60,91)

Engagement and personal characteristics

Age of participants was found to be associated with markers of engagement including uptake, attendance, and dropout in four studies.(60,90,93,100) Increased attendance was associated with older age in two studies (60,93) focused on chronic pain and weight management. In contrast, in another weight management intervention, those aged over 60 years were more likely to decline

to participate than those under 60.(100) No association was found between age and completion of the intervention versus non-completion in four further studies which examined this relationship.(59,68,89,102)

Several studies reported no association between gender and any markers of engagement, although more women accepted the invitation to take part in one chronic disease management intervention.(94) In the four single-gender studies, engagement with the intervention varied, but retention for all was over 75%, and was 96% in one study focused on type 2 diabetes prevention in women.(68) However, these figures are similar to retention in five other studies, which were not focused on a single gender.(69,91,93,97,102)

Of the included studies that reported participant race/ethnicity (13 of the 19 included papers), 12 of these studies reported a majority of White participants. However, three studies did report on associations (or lack thereof) between ethnicity and engagement. One study of a weight management intervention found in a logistic regression model that identifying as Black, Asian, or from a Minority Ethnic group reduced the likelihood of consenting to participate in virtual group interventions.(100) Another study, of type 1 diabetes management in young adults, found that non-completers were more likely to identify as multiracial than those who completed the intervention.(89) However, in one weight management intervention there was no association found between race, ethnicity, and drop out.(59)

Three studies found an association between different markers of engagement, including enrolment and session attendance, and the health status of participants. In one general chronic disease management intervention in older adults, it was found that participants with back pain, four or more chronic conditions and/or a longer duration of type 2 mellitus were more likely to consent to participate.(94) Another study focusing on type 1 diabetes management in young adults found that longer disease duration was associated with decreased attendance (90) but this was contradicted by another study in young adults, which reported no association between type 1 diabetes duration and engagement in an intervention.(89)

Other health-related factors that were associated with decreased engagement in some interventions were increased BMI, reduced weight loss, and increased depression. In a weight management intervention, it was found that on average, participants lost to follow up had a higher baseline BMI, and had lost less weight at 6 months.(93) Contrastingly, no association was found between baseline BMI and completion of the intervention versus non-completion in three other studies.(59,68,102) In another study, a higher total score on a depression scale (PHQ-8), indicating higher levels of depression, was associated with increased odds of poorer attendance.(92)

No difference was found between those who declined to participate and those who participated in two studies examining gender, weight, baseline BMI, and deprivation,(100) and age, living circumstances, education, and health insurance respectively.(94)

Three studies found no association between engagement and participant characteristics. One intervention for the prevention of type 2 diabetes and cardiovascular disease found no discernible pattern to the recorded attrition.(91) Similarly, no association was found between any personal characteristics and completion of the intervention versus non-completion in two studies, focusing on chronic pain and weight management.(60,95) Furthermore, no associations were reported between SES characteristics and engagement in included studies.

Summary

Virtual groups were generally well-attended, and in many cases, more highly-attended than their comparators. Attrition was generally low for virtual group interventions. However, there was no clear pattern to retention and attrition. Patterns of engagement for different sociodemographic and socioeconomic groups were somewhat inconsistent with regards to age, gender and ethnicity, and although there was some limited evidence for links between health status and engagement, numbers of studies examining this were small.

2.3.3.2: Barriers to attending/engaging with sessions

Reasons for not attending sessions

Scheduling conflicts were amongst the most common reasons given for not consenting to participate in an intervention, not attending intervention sessions, and withdrawing from interventions. They were cited as reasons for non-attendance in interventions focusing on chronic disease management in older people, chronic pain, and weight management.(60,94,95) Specific scheduling conflicts amongst the older people included caring responsibilities and healthcare appointments.(94)

Medical factors were also common reasons for non-attendance. In an intervention for chronic disease management in older adults, illness was a common cause of non-attendance.(94) In another cardiac rehabilitation intervention, three participants dropped out to have surgery, including having a pacemaker fitted.(102) Similarly, in a third study, of a weight management intervention, a participant withdrew for medical reasons.(69)

The technological aspect of virtual group interventions was also a reason for non-attendance. In two weight management interventions, lack of internet access was cited by participants as a reason for not participating in sessions.(69,100) In one, it was not reported whether participants were loaned equipment,(100) in the other, participants were not loaned equipment.(69) In one chronic disease management intervention for older adults, where participants were loaned equipment, participants still cited a lack of digital skills as a reason for not attending sessions.(94)

Barriers to accessing programmes remotely

Participants in one study reported feeling as though a language barrier meant that they had to “pay more attention” during virtual group intervention sessions.(69) During sessions, participants in one weight management intervention for women experienced distractions from other group members doing things in their homes during their virtual group sessions.(95) Similarly, a

telerehabilitation intervention for heart failure found that despite being loaned equipment, several factors inhibited participants from benefiting from their virtual group sessions,(96) including visual difficulties, fear of the unknown, and lack of computer experience. However, the barriers to taking part in virtual groups were the same between those with and without computer experience – all disliked audio and visual problems but found ways to cope.(96)

Technical problems during sessions

Two studies reported participants experiencing technical problems during their intervention sessions, but neither were major problems that affected session delivery in the long-term. In one weight management intervention for women, these technical problems included audio delays that resulted in participants talking at the same time as one another, background noise and feedback, and the associated time spent on resolving technical difficulties.(95). Similarly, audio-visual and connectivity issues were cited as specific technical problems that acted as barriers to participants experiencing benefits from a cardiac rehabilitation intervention.(96)

Summary

A small number of studies reported specific barriers to attending sessions, including health-related barriers and scheduling conflicts. When sessions were attended, barriers to engagement included fear of the unknown and distraction. Technical problems weren't generally regarded as a major barrier to engagement in the long-term.

2.3.3.3: Experiences of using virtual group technology

Comparing experiences of virtual and face-to-face groups

Two studies found that group sessions were seen as less of a burden, and more convenient than in-person sessions, whilst the technology was judged as easy to use.(69,99) In one of these studies, participants were loaned equipment,(99) in the other, they were not.(69) Engaging with online sessions was also seen as

more private, less intimidating, and less stressful than engaging with in-person sessions in one of the studies.(99)

In some studies, virtual groups were particularly appreciated by certain groups of participants. For example, in one chronic condition management intervention for older adults, participants with mobility problems valued meeting others virtually.(94) In this same intervention, virtual sessions were seen as highly convenient, particularly by participants who were housebound. Those with anxiety also appreciated virtual delivery. In a pulmonary rehabilitation intervention, participants found that participating virtually helped them to conserve energy.(97)

Participants perceived several advantages of virtual groups for social interactions compared to in-person interventions, including participants in one intervention for COPD management commenting that virtual groups were less embarrassing than face-to-face groups.(98) Participants in a general chronic disease management intervention also reported feeling that it was easier to open up to other participants in a virtual group than it would be face-to-face, and that group conversations were perceived as being more in-depth virtually than in-person.(99)

Other reported advantages of virtual groups compared to in-person groups included a lack of distractions, which was reported in an intervention for general chronic disease management.(99) In another intervention aimed at improving weight management in women, where participants were loaned iPads to take part, participants found it easier to join the intervention virtually than face-to-face.(95) Similarly, participants in a type 1 diabetes management intervention for young adults remarked that face-to-face appointments were harder to arrange than virtual appointments.(90) Additionally, participants in a telerehabilitation intervention for heart failure perceived a virtual intervention as being cheaper for the user than centre-based interventions.(96)

However, in two interventions, participants expressed their preference for face-to-face groups over virtual groups.(95,98) In one weight management

intervention, some participants said they perceived a lack of social presence in the virtual group.(95) In a COPD intervention, some participants commented that a virtual group felt isolating, and that they missed the 'banter' of an in-person group.(98) In another intervention, participants preferred a combined face-to-face and online approach, with 47% of participants surveyed saying that they would prefer to receive both formats.(96)

New technology users

Two studies reported findings from participants who were new to using technology.(94,96) One found that participants who were concerned about using new technology also felt more uncertain about joining the virtual group in the first place.(96) The same participants felt positively towards the technology by the end of the programme, saying that using it was a positive challenge.(96) In this intervention, participants were loaned technology in order to take part, and technical problems experienced by new users were the same as those encountered by more experienced users.(96) Similarly, in an intervention for chronic disease management in older adults, where participants were also loaned equipment, participants reported that they enjoyed engaging with new technology.(94)

Summary

Virtual group interventions were seen as more convenient than in-person group interventions by many participants, although some participants reported missing stronger social connections that they experienced in in-person groups. New technology users generally felt uncertain to begin with, but engaging with new technology became a positive experience as the interventions continued.

2.3.3.4: Experiences of intervention features

Comments about the intervention as a whole

In six studies, participants commented on their experiences of the intervention as a whole.(60,90,91,97–99) Many comments were positive overall. In one intervention for chronic disease management, virtual groups were looked forward to by participants, and were a highlight of many participants' weekly schedules.(99) In a COPD and type 2 diabetes education intervention, participants felt 'positive' about virtual groups after having completed the intervention and virtual groups were labelled as 'the future' by one participant.(97) One participant in an intervention for COPD management taking place in 2020 during the social restrictions of the Covid-19 pandemic remarked that virtual group programmes were 'very good' considering their personal circumstances.(98)

In a post-intervention survey for a cardiovascular risk management intervention, overall satisfaction with the intervention was high.(91) In a survey of 47 participants of a chronic pain management intervention, most participants (63%) rated the intervention as 'very helpful', and 94% said that they would recommend the programme to others.(60)

Experiences of specific intervention features

Participants shared their experiences of specific features of interventions in four studies.(90,91,97,98) In one, focusing on lowering cardiovascular risk, participants noted that facilitators were a highly important feature of the intervention (91) and also reported being satisfied with the virtual group technology, which was a sentiment shared by young adults participating in an intervention, which aimed to improve type 1 diabetes management.(90)

In one intervention for COPD management, participants found the content of the sessions challenging at the beginning, but were more comfortable with session content at the end of their programme.(98) One participant in an intervention for reducing cardiovascular risk commented that they appreciated the self-monitoring content of their group sessions.(91)

In one intervention for pulmonary rehabilitation and diabetes education, participants observed how each group member contributed to discussions within sessions, and that listening to other group members was a regular activity in sessions.(97) Similarly, two interventions, one for chronic disease management and one for weight management, found that participants enjoyed sharing how their condition has affected their lives, and asking peers for advice within the virtual group.(69,99)

Participants appreciated the care that they received in virtual groups.(90) However, in one pulmonary rehabilitation and diabetes education intervention, participants also appreciated the care they received outside of the virtual groups: an initial in-person meet-up with fellow group members, and individual consultations that formed part of this intervention.(97)

Participant-reported outcomes

Participants in six interventions reported experiencing positive outcomes related to behaviour change as a result of taking part in virtual groups.(90,91,95,96,98,102) Intervention content, alongside group support, helped to foster behaviour change in one weight management intervention for women.(95) Participants in an intervention for COPD management had positive feelings as a result of attending, as well as increased self-efficacy and self-belief surrounding self-management as a result of the virtual group.(98) They also experienced forgetting about their condition as a result of the intervention.(98)

Further positive outcomes were reported elsewhere. Participants in a type 1 diabetes management intervention reported improved satisfaction with appointments generally as a result of the intervention compared to controls.(90) Similarly, a cardiac rehabilitation intervention helped to encourage participants to adopt healthier lifestyles, and participants in another cardiac rehabilitation intervention experienced a perceived improvement in self-management-related knowledge as a result.(96,102)

One frequent outcome for participants was an increased understanding or acceptance of their own condition as a result of the intervention.(69,94,99) One intervention, based around general chronic disease management, helped participants to increase their acceptance of their conditions even though they acknowledged that it was difficult to accept they could not change society's views towards disabled people in general.(99) In a weight management intervention, it was found that the groups helped participants to learn new strategies, such as ways to control portion sizes.(69) Similarly, in an intervention for managing chronic conditions in older people, participants felt empowered by learning more about their condition in the virtual groups, and some participants valued the health information that they gained in the intervention more than meeting new people.(94)

Summary

Overall, virtual groups were regarded positively by their participants. Session content and facilitators were important, and positive outcomes that came from engaging with interventions included increased satisfaction with healthcare, as well as increased understanding and acceptance of one's own condition.

2.3.3.5: Experiences of group interactions

Positive group dynamics

Participants in many interventions experienced positive dynamics within their virtual groups. In a post-intervention survey of one cardiometabolic risk reduction intervention, participants were satisfied with group dynamics.(91) Similarly, participants in a pulmonary rehabilitation and diabetes education intervention commented that the social aspect of their intervention was positive, and a very important feature of their participation.(97) These thoughts were echoed by participants in two interventions for chronic pain management and weight management, who appreciated interaction with peers who shared their condition.(60,69)

Bonding with other participants was discussed, with participants in an intervention for general chronic disease management feeling unity and experiencing bonding within their virtual group.(99) These thoughts were echoed by participants in an intervention for chronic disease management in older adults, but it was noted that amongst groups with a more consistent membership, companionship and bonding between group participants was stronger.(94)

As well as bonding with other group members, many participants felt relaxed, comfortable, and safe within their virtual groups.(60,90,94,96) In an intervention for type one diabetes management in young adults, participants felt comfortable in sessions because of their positive dynamic, felt that they could speak freely and felt able to express their concerns comfortably and privately within the group.(90) This was echoed in an intervention for chronic disease management for older adults, where participants reported feeling relaxed and able to question and challenge others within the group because of its positive dynamic.(94) Groups were also considered to be safe places, with participants in cardiac rehabilitation and chronic pain interventions feeling relaxed and safe in their groups.(60,96) However, no studies in this review reported any safeguarding measures put in place for participants or facilitators, including facilitator safeguarding training.

Activities relating to positive group dynamics

Several reported activities that group members took part in appeared to be linked to groups having a positive dynamic. For example, participants sharing experiences/anecdotes and advice with one another in virtual groups, was seen as a positive activity,(69,94,97,99) including in interventions for weight management, pulmonary rehabilitation and diabetes education, and general chronic disease management in older people.(92,93,95,96)

As well as sharing experiences and advice, positive social support was experienced by many participants.(69,90,94–96,99) Participants in one cardiac rehabilitation intervention stated that social support was a motivating factor for participating in the virtual group.(96) In a weight management intervention,

receiving peer support from other group members was reported as helping participants to overcome challenges associated with weight loss, such as overcoming cravings, or changing eating habits.(69) In this intervention, participants also said that they identified with other group members. Similarly, in one intervention for chronic disease management, participants identified with others' situations within the group, and provided each other with empathic support.(99)

Comparing oneself to other group members was another important facet of interactions.(69,94) As a result of comparing with others in a weight management programme, participants internalised their ownership of responsibility, meaning they increased their own responsibility for their health-related decision making, and were more decisive about actions to best foster behaviour change.(69) In this intervention, seeing oneself as a role model for other group members also boosted morale. Similarly, in an intervention for general chronic disease management in older adults, interaction with other participants boosted resilience and coping.(94)

The value of interacting with other group members

Participants experienced interacting with other group members positively; for example, participants described not feeling alone within the virtual group in two general chronic disease management interventions.(94,99) In one, participants described a shared experience, and reported how participants provided one another with emotional support in the virtual group.(99) Similarly, in another, older adults described how they made new connections with their fellow group members.(94) Participants in this intervention also shared how the virtual group sessions were sometimes the only social interaction that they had in a day, and that the group was a source of emotional support, with the social interaction being of equal importance to them as the health education aspects.(94)

Social limitations of virtual groups

Several studies reported participants feeling there were social limitations within their virtual group.(95,97,98) In two interventions, one for COPD and type 2 diabetes education and one for COPD management, participants commented that there was a lack of informal interaction and opportunity for impromptu breaks in virtual groups, in comparison to in-person groups.(97,98)

In three studies, participants perceived a lack of group connection and cohesion in virtual group sessions.(95,97,98) Participants in a COPD intervention said that they felt isolated, and participants in an intervention for weight management in women felt a lack of ability to connect to their fellow group members.(95,98) One intervention for COPD and type 2 diabetes education found some participants were particularly unhappy with group cohesion and communication.(97) These participants recalled in interviews that there was a lack of eye contact during virtual group sessions. They also commented that participants tended to communicate through a group leader instead of talking to one another, and that participants talked over one another during sessions.(97)

Summary

Generally, positive group dynamics were observed in virtual groups, and were linked to activities such as sharing experiences, advice, and comparing oneself to other group members. Effects of interacting with other group members included feeling less alone, although some social limitations of virtual delivery included a perceived lack of group connection and cohesion.

2.4: Discussion

2.4.1: Summary of main findings

This systematic review synthesised existing evidence on virtual group interventions for preventing and/or managing common chronic physical conditions including data on participant engagement with and experiences of these interventions. It also provided a description of the current literature base on

this topic: 19 papers discussing 17 interventions were included, from several countries, covering conditions including obesity and type 1 and 2 diabetes mellitus. These furthered our understanding of how virtual groups are received by those taking part, so that recommendations can be made for how interventions can be developed in the future, and for further research.

This review highlights that (A) virtual groups were generally well-attended, although evidence surrounding the links between engagement and personal characteristics was mixed. (B) Scheduling conflicts, distractions, and technical problems were reported barriers to engagement in some studies. (C) Many participants preferred virtual groups to other interventions because they were seen as convenient and less stressful, but some still preferred having face-to-face elements because of a perceived lack of social connection in virtual groups. (D) Facilitators and session content were important, with participants experiencing positive outcomes including increased self-efficacy and self-management knowledge. (E) Most virtual groups had positive group dynamics with participant bonding, sharing of experiences, and social comparisons reported as supporting behaviour change and positive outcomes. The following section discusses these themes in more detail, comparing with existing literature.

2.4.2: Factors affecting engagement with virtual group interventions

This systematic review explored the many ways in which personal characteristics, including age, gender, health-related characteristics, ethnicity, and race of participants were associated with engagement with virtual group interventions. Markers of engagement included session attendance, intervention enrolment, and dropout.

Personal characteristics

Evidence for associations between personal characteristics and engagement was mixed. It was important to explore these potential associations for many reasons, including being able to identify which personal characteristics may be

associated with increased, or decreased, engagement with virtual group interventions so that recommendations for altering recruitment and advertising methods may be made in order to recruit specific target populations. Similarly, recommendations for retaining participants may be made based on any associations between demographic characteristics and engagement with interventions. For example, if age was found to affect the average attendance of most interventions in this review, the pertinent next step for future research may be to investigate how to improve intervention delivery for certain age groups, perhaps through targeted PPI input. However, the mixed findings here are perhaps unsurprising, as included studies were small in number, focused on a range of conditions, and characteristics of participants were highly heterogeneous and interacting, making it hard to identify any consistent relationships (see **2.4.5: Strengths and limitations of the current review** below for more detail).

No clear association was found between participant age and engagement with virtual group interventions. The ‘digital divide’ describes how some population groups are more likely to use technology than others, and studies on this have consistently found that older adults are less likely to engage with technology than younger adults.(104–106) Despite the lack of an overall pattern pertaining to the digital divide in this review, engaging older adults remains an important consideration for providers of virtual group interventions. Indeed, many interventions have overcome the age-related digital divide by providing adequate support and education to increase the capability and motivation of older adults to use technology.(107,108) Whilst it should be noted that this review did not include many participants aged over 75, where the digital divide is the most stark, these findings demonstrate that older individuals were not necessarily less likely to engage in virtual group interventions than their younger counterparts.(109) Older individuals should therefore not be dismissed when considering populations for virtual group delivery of interventions, and should be offered appropriate digital support where necessary, including provision of equipment.

Group characteristics and social identity theory

Social identity theory posits that behaviour change facilitated in a group setting is improved when a participant identifies as a member of a group.(110) Furthermore, any health benefits gained from being a group member are only gained to the extent to which someone identifies as a part of that group.(110) In other words, if an individual identifies strongly as being a part of a group, they are more likely to behave in accordance with a group's norms, and experience any health benefits or harms associated with being a part of this group.(111) This is known as the Norm Enactment hypothesis, and in this review, this means that if a participant strongly identified as being part of, for example, their virtual weight management group, this may have increased their motivation to practise the self-management behaviours associated with the group, and engage with intervention sessions.(111)

It has been hypothesised that individuals identify more strongly with groups that they view as having similar characteristics to themselves, because it allows for stronger feelings of trust and mutual influence to build between group members.(112) For example, male-only interventions have seen participants experience high levels of social identification with the group.(112) In a systematic review on group-based interventions for weight loss, it was found that male-only interventions were more successful at achieving engagement and weight loss than with mixed-gender groups.(16) This relationship between single-gender interventions and improved engagement was also shown in this review, where single-gender interventions had high retention, over 75% in all cases. Whilst other factors are clearly important, as some mixed-gender interventions also had comparable retention rates, clearly group composition is an important factor to be considered by intervention providers. It is not known if virtual delivery of interventions impacts social identity in participants. However, because of the impact of virtual delivery on social interactions (as discussed in more detail below in **social limitations of virtual groups**), which may include social identity, providers should think carefully about the effects that group composition may have on participants' social identity and subsequent engagement with a virtual group intervention.(111)

Health-based characteristics and the link to intervention engagement

Health-based characteristics were also linked to engagement in some included studies. However, as was the case with the other personal characteristics outlined above, findings were mixed, particularly for more general markers of health, such as self-rated health or the number of chronic conditions a participant has. This is common in the literature, where the evidence for the link between self-rated health and engagement is also mixed.(113,114) This may be due to studies using different metrics to measure 'health'; for instance asking participants to self-describe as 'ill' or 'healthy' may glean different results to asking participants how many chronic conditions they live with, or how engaged they are in their own healthcare.(113,114)

There were also mixed findings regarding diabetes duration and engagement, perhaps because of the inclusion of different types of diabetes. It was found that a longer duration of type 2 diabetes was linked to increased engagement with virtual group interventions, and the opposite was found for type 1 diabetes.(90,94) Whilst those with type 1 diabetes may become more confident in self-managing over time, a longer type 2 diabetes duration has been associated with greater HbA1c levels and increased engagement in self-management interventions.(115–117) This may mean that the motivation for those with type 1 diabetes to engage in an intervention decreases over time, whereas the same may not be true for those living with type 2 diabetes. However, participants' diabetes-related motivations for engaging with interventions were not specifically explored in the studies included in this review. Providers of virtual group interventions should seek to understand how diabetes duration affects participants' outlook and participation in the study. This may allow for alterations to the intervention to be made to increase engagement, such as specifically tackling diabetes-related issues, like diabetes distress.

Many participants in included studies found virtual groups more accessible than in-person groups, for health-related reasons. Participants with anxiety felt reduced feelings of stress in virtual groups, compared to in-person groups.

Participants also commented that virtual meetings felt less intimidating than in-person sessions, and that feelings of stigma were reduced, because participants were able to attend the sessions from their own environment and take breaks from the screen when necessary. This links to the literature, where participants have valued the remote nature of programmes, because of increased feelings of comfort, and reduced feelings of overload that may be associated with in-person sessions.(72,118) Whilst these findings were from different populations to the ones included in this review, this evidence demonstrates that virtual groups may be an appropriate alternative to in-person groups for those who may find an in-person group anxiety-inducing. Similarly, some participants in this review with mobility limitations found that virtual delivery made the interventions more accessible than in-person groups. This links to previous literature, where participants have commented that a lack of travel makes virtual interventions easier to attend, as travel, and associated issues such as finding wheelchair-accessible parking on-site, can act as a barrier to participation.(72,118–123) Combined with the findings above, this demonstrates how virtual groups may represent an important way to improve accessibility for those with some health-related limitations.

2.4.3: Engaging with and experiencing virtual group sessions

Experiences of virtual delivery in the context of Covid-19

When discussing the findings of this review in context, the impact of the Covid-19 pandemic should not be overlooked. Whilst not all studies in this review were conducted post-2020, some participants remarked that virtual groups were good ‘considering’ their circumstances, which at the time, involved living under strict social restrictions. This is echoed in other literature situated in the height of Covid-19-related social restrictions. For example, when commenting on video consultations within primary care, participants felt the group videoconferencing process was far more natural than it may have been before the pandemic.(118) It is difficult to determine whether public opinion towards virtual groups has shifted post-pandemic, but these findings indicate that participants may have been more

amenable to virtual delivery as a result of social restrictions that took place during the pandemic. However, despite this, designers of future interventions should still assess the suitability of (and desire for) virtual groups within their target populations, through maintaining dialogues with colleagues and potential participants.(124)

Accessibility

Loaning technology to participants

The Capability, Opportunity, Motivation-Behaviour (COM-B) model of behaviour change outlines the key factors that must be in place in order for an individual to undertake behaviour change.(125) This states that an individual requires the physical and psychological capability, the social and physical opportunity, and the motivation at the right time to perform the actions required to change behaviour. The opportunity for participants to engage with virtual group interventions is partly determined by access to appropriate technology. In included studies, loaning participants equipment may have been associated with improved engagement – two included studies with high overall attendance were studies where participants were loaned devices.(59,94) One study with lower attendance didn't loan equipment, and participants cited lack of internet access as a reason for not participating.(100) Because of the small number of studies and lack of formal statistical analysis, this review cannot conclude that loaning technology was linked to engagement, but these findings link to previous evidence which suggests that loaning devices is an important way to increase accessibility of digital healthcare interventions.(118,126)

Virtual group intervention organisers should consider that many potential participants may have the motivation and capability to take part in their intervention, but do not have the opportunity to do so, because of a lack of technology. Not considering these factors may exclude these individuals and increase health inequity. This may be particularly important when considering findings suggesting that the rapid adoption of digital healthcare during the Covid-19 pandemic increased inequity, as this rapid adoption was not tailored for those

with limited access to technology.(127) The practice of lending participants equipment for the purposes of an intervention may have the potential to increase accessibility of virtual group interventions. However, it should be noted that any recommendations to investigate the feasibility of loaning equipment should be treated with caution. This is because the SES markers used in the included papers were not standardised (i.e., there were four different markers used), and few of the studies featured participants with a low average socioeconomic status, according to the different markers.

Scheduling of interventions

Many reported barriers to engagement identified in this review are also common barriers to engaging with in-person group interventions, such as scheduling conflicts. Because virtual group interventions are delivered remotely, it may lead to the belief that scheduling may be easier than for in-person groups. Although there was no direct comparison with in-person interventions in this review, this does not appear to be the case: conflict due to scheduling was found to be the most common barrier to engagement. This echoes findings from previous in-person and virtual group interventions.(123,128,129) Providers should understand that virtual delivery may not remove the barrier of scheduling conflicts for participants. Instead of relying on the virtual nature of intervention delivery to reduce conflicts, intervention organisers should ask non-attenders for their reasons for not attending virtual group sessions, so that their attendance may be enabled, or so that a suitable alternative to the intervention may be sought.

Language of interventions

Other barriers to engagement included language barriers and distraction. Language barriers have been reported in previous studies.(130,131) This issue may be even more pertinent within virtual interventions, compared to in-person interventions, as findings from this review suggest. Designers and facilitators of future virtual group interventions should be mindful of the implications that virtual

delivery may have on those experiencing language barriers and should incorporate measures to mitigate these within their intervention design, such as ensuring that each participant has access to adequate audio technology and support, such as live captioning software.

Distraction during interventions

Distraction is a barrier to engagement that may pertain to virtual group interventions in a unique way. Participants in this review sometimes felt distracted at home, as well as becoming distracted by other group members doing other activities alongside their session, such as cooking.(95) Linking to the findings on the convenience of sessions, some participants within other included studies commented that the ability to undertake tasks at home during sessions increased the acceptability of sessions, as they could fit the sessions in around their home lives more easily.

This demonstrates that whilst virtual delivery may increase distraction for some, others value the ability to complete activities that they would not be able to perform in a clinic environment. Therefore, this may make the interventions more acceptable for the participants who can complete other activities, but less effective for them, due to the participants failing to be fully ‘there’, in the moment. This in turn may render the interventions less acceptable and effective to other members of the group. This could also link to group dynamics (see below): participants getting distracted may hinder participant bonding and a feeling of group cohesion, as participants may not be able to fully take part in group discussions. Echoing other findings of this review, this demonstrates that virtual delivery may be more appropriate for some individuals than others, and this should be taken into consideration by designers, as well as potential participants, when deciding to enrol on a virtual group intervention.

Participants’ perceptions of the safety and security of technology

Participants reported that they felt safe using the virtual group technology, commenting that the virtual groups felt private and secure. This is a key concern within all group interventions; all participants should feel safe in their group setting in order to successfully engage with the intervention and facilitate behaviour change.(78) Unlike in-person group interventions, virtual interventions have to mitigate additional concerns over sharing confidential information online, which has been reported in previous studies.(118,132,133) To reassure participants that their privacy and security will not be compromised, session facilitators should be deliberate and clear in their explanation of security features of the technology being utilised.(133) Facilitators should also be well-lit, and introduce themselves to participants thoroughly, including describing their location clearly.(133)

Participant safeguarding is another concern within group interventions. Unlike in-person interventions, facilitators have little knowledge of where participants are located during virtual group sessions.(132) Facilitators may also find safeguarding concerns more difficult to identify remotely compared to in-person. Specific concerns raised in the literature include a lack of a private space for participants, or the out-of-shot presence of a controlling or abusive individual during sessions.(132,134) These studies focused on remote consultations, rather than multi-session virtual group interventions, but these concerns remain pertinent to all virtual modalities. No studies in this review referred to safeguarding in their reports. This is a serious concern for designers and facilitators, and should be considered during planning of virtual groups, with facilitators given adequate training on identifying and reporting safeguarding concerns that arise in a virtual setting.

There were several examples of technical problems arising within included studies. In most cases, these were not perceived to be major barriers to engaging with the intervention. This may be due to a good baseline level of technical literacy amongst participants, or perhaps that adequate technical support was offered to participants. In one included study, those who were experienced at using technology encountered the same technical problems as those who were new technology users.(96) This demonstrates that technical problems are faced by a range of users, including users who are confident with technology, which

suggests that offering technical support to participants will continue to be important in the future, when general level of technical literacy and confidence amongst participants may be higher. A study evaluating the introduction of video consultations in the UK found that professional and clinical staff within healthcare centres were responsible for managing the technical aspects of the appointments.(135) This was seen as a disadvantage to video delivery, and demonstrates the importance of offering adequate technical support to participants and facilitators of virtual groups.

Expressed preferences for in-person delivery

Though there were few direct comparisons of virtual groups to in-person groups, participants in some included studies expressed their preference for in-person groups. Participants felt as though they didn't experience a social presence in the same way as they would have in an in-person group, and reported that virtual groups sometimes felt isolating. In the literature, facilitators have commented that it can be harder to establish a rapport within virtual groups compared to in-person sessions.(118) However, within this same study, participants valued connecting with others in their virtual intervention. This demonstrates the influence of group dynamics on how participants perceive virtual groups compared to in-person groups. Facilitators should take particular care in virtual groups to establish a rapport with, and between, participants, to help ensure that virtual group dynamics are positive.(78) Likewise, if participants simply wish to take part in an in-person intervention over a virtual intervention, this should be taken seriously by providers. Participants should be able to share in the decision-making process with providers and access the intervention that they believe is best suited to their needs.

Facilitator competence

In this review, participants commented that facilitators were highly important in virtual group interventions. This is corroborated by the evidence base; studies have consistently acknowledged the key role that facilitators play in the delivery

of a successful group intervention.(21,22,118,136) Key features of an effective facilitator include their tone, their ability to empathise with participants, and their professionalism.(22,78,137) This may be particularly important in a virtual group, because of the changes to social dynamics that may take place with virtual delivery. This means that comprehensive facilitator training is vital.(21) However, echoing the lack of reporting of training in this review, it was found in a systematic review of group-based weight management interventions that training of facilitators is rarely reported.(16) This demonstrates that despite participants' accounts of the importance of facilitators for the success of interventions, training of facilitators for virtual group interventions is poorly understood. Future studies on virtual group interventions should detail how they trained their facilitators to successfully manage their virtual groups, so that this can be better understood for future interventions.

Experiences of group dynamics

Generally, participants reported experiencing positive group dynamics within their virtual groups. Positive group dynamics are important for behaviour change in group interventions, and include group cohesion, group climate, and group norms.(78,137) In this review, participants reported feeling less alone as a part of a group, and experienced companionship, unity, support, and comfort from other group members. Many previous in-person groups have shown that group cohesion and genuine relationships can form between group members, particularly during opportunities for informal interaction and camaraderie.(22,26,137,138) For several logistical and social reasons, facilitating informal interaction in a virtual group environment may be more challenging than in-person, but the findings from this review suggest that building a positive group dynamic is still possible. Facilitators of virtual groups should prioritise cultivating a trusting, friendly dynamic within which group participants can share their experiences with other members of the group, and this could form an integral part of their training.

Participants experienced high levels of social support from fellow virtual group members in included studies. This is a common finding in studies of group-based interventions.(16,139,140) Social support may be experienced in different ways, including encouragement, reciprocal help, and celebrating achievement of goals.(22,137) The importance of social support as an interpersonal change process has been discussed in previous literature in virtual and in-person settings.(78,118,137,141) Social support from group interventions may be particularly important for participants with reduced support in their existing social circles.(22,142) Social support is more likely within cohesive groups in which participants experience high-quality relationships with one another, which, as discussed above, may require more careful and considered facilitation in a virtual group compared to in-person.(143) This highlights the importance of virtual group facilitators striving to foster a positive group environment, with opportunities to form trusting, genuine relationships, in order to facilitate behaviour change successfully.

Sharing with others is another important aspect of a group intervention.(16) Participants in included studies commented that they appreciated sharing anecdotes and advice with fellow group members. This echoes findings from the wider literature, where sharing of anecdotes and advice has been found to be an important part of group interventions, and an important interpersonal change process.(22,78,144) Despite this, some participants in included studies and elsewhere have commented that some topics may be too personal to be shared in a group setting, demonstrating the importance of creating a safe and comfortable environment for participants in virtual groups.(22,136,145) By achieving this, participants may feel more able to share and have meaningful discussions.

Sharing with others can result in social comparison, as identified in this review. In included studies, when participants compared themselves to others, their sense of responsibility increased, as well as their morale, resilience and coping. These positive effects are echoed by the evidence suggesting that social comparison is an important interpersonal change process, helping to enhance motivation and self-efficacy.(22,78) Despite the recognised positive impact that social

comparison may have on behaviour change, for some participants, particularly those who may be having less success with meeting intervention-related goals, comparing to others may cause the opposite effect, decreasing motivation.(22,141)

It has also been noted that social comparison may be difficult to observe in participants in in-person groups.(78) It may be even more difficult to do this in virtual interventions, because of the lack of ability for facilitators to observe non-verbal cues and have informal interactions with participants. This means the active facilitation of *positive* social comparison within virtual groups may be even more important than in in-person groups. Taken together, these findings suggest that comparing to others in the group is an important part of a successful virtual group intervention, however, specific inter-participant circumstances should be taken into account, as some comparisons may be detrimental.(78) In these cases, the management of group dynamics by facilitators becomes particularly important.

Despite many participants reflecting positively on their experiences of group dynamics, there were some instances where group interaction within included studies was limited. This included feeling there was a lack of opportunity for informal interaction during break times, compared to in-person groups, as well as a lack of cohesion and connection between participants. This is reflected by some findings in the literature around virtual groups – one interview-based study on video group consultations in UK primary care found that facilitators found it hard to build a rapport with members of their group.(118) They struggled with a lack of non-verbal communication and commented that their sessions sometimes felt scripted. When sessions continued, and the connection to participants became stronger, group leaders felt more relaxed, and discussions were easier to facilitate. It may be logical to assume that the social limitations in virtual groups are a result of the virtual delivery, but this lack of cohesion was sometimes present in in-person groups.(22,123) This indicates that social limitations may not always be due to virtual delivery, and that time should be spent on fostering a positive dynamic within group members regardless of the format. This is the responsibility

of group designers and facilitators, who can assess the extent to which their group is compatible and can implement techniques to facilitate group dynamics.

2.4.4: Recommendations for future interventions

These recommendations pertain to future intervention design, rather than future research, although their use in future virtual group interventions may be helpful for informing future avenues of investigation. After each recommendation, the potential feasibility of the recommendation is considered in the present NHS context. For a summary of these recommendations, see **Table 7**, below.

Developing a positive group dynamic

Intervention designers and facilitators should ensure that they foster positive social connections within virtual groups as informal opportunities for social interactions are more limited, and social connections may take longer to form. Facilitators could use similar verbal techniques to facilitate group dynamics, as recommended for in-person groups, such as referring to the group as ‘we’, presenting the group as attractive, using names, humour, addressing and managing negative behaviour, and having group rules in place.(146) Developing this skill may form an integral part of facilitator training.

Similarly, the importance of social identity for committing to a virtual group and initiating behaviour change has been discussed. Session organisers can assist with achieving a sense of social identity within their participants by composing groups thoughtfully, as recommended by Tarrant *et al.* (2020).(111) As discussed in this chapter, a sense of shared social identity may be fostered more easily within groups where participants see themselves as similar to one another, so by ensuring that virtual groups are composed of individuals with similar characteristics, such as gender or age, session organisers may maximise the likelihood of participants feeling a sense of shared social identity. Other techniques may include talking to participants in an inclusive way, emphasising that the group plays an important role in achieving their goals, and encouraging co-operation and interaction between participants.(111) These techniques may be even more important in virtual groups compared to in-person groups, because

of the comparative lack of ability to foster shared social identity through more informal socialising, such as spontaneous interaction between participants.

Training facilitators in fostering positive social interactions between participants may only involve adding to the existing training that facilitators undertake before starting their delivery. In this case, this may represent an easily achievable action step. Facilitators may already perform many of these behaviours, such as encouraging co-operation and shared goals, and enacting this recommendation may simply involve reminding facilitators of the importance of creating a positive group dynamic. Less simple, however, may be the act of comprising a group deliberately so that positive social dynamics in the group may come more naturally. If delivered *via* the NHS, group composition may be out of organisers' control, as participants may be referred onto the next available programme by their GP. In any case, this places even greater importance on having a trained facilitator who is able to competently manage the social dynamics of a group in a positive way.

Safeguarding

In the case of virtual interventions, participant safeguarding may be especially critical, because session facilitators cannot see beyond what's being presented by a participant's camera. This potentially increases the risk of safeguarding concerns that may have been present within an in-person intervention going undetected within a virtual intervention. Therefore, intervention designers and organisers should dedicate time to training facilitators to recognise the different ways in which a safeguarding concern may manifest itself within a virtual group intervention, and how to report concerns. Participants should also know how to report any safeguarding concerns.

As well as safeguarding, privacy of participants within virtual interventions should also be prioritised. Beyond ensuring that the intervention is compliant with local data governance legislation, organisers should make clear to participants that their privacy is a priority, and who participants can go to should they have a privacy concern. As has been recommended in previous studies of virtual

interventions, facilitators should make clear that their location is private, to reassure participants.(133) Additionally, participants should be made aware that they should be taking part from a private location, and session rules should include not sharing of details outside of sessions. Similarly to the previous recommendation, this may be achieved effectively by emphasising the importance of safeguarding and privacy in facilitators' training. In the present NHS context, this may represent a simple and feasible way to improve acceptability of these interventions, which need not involve drastic changes to the way that interventions currently operate.

Improving accessibility

Intervention organisers should consider the implications of their decision to loan, or not to loan, participants equipment for the intervention. In some cases, loaning technology may increase participants' opportunity to engage with the intervention and not loaning technology may increase health inequity. Intervention organisers should consider whether members of their target population are likely to benefit from being loaned equipment. Having an open dialogue on this matter with members of the target population, for example through discussions with patient and public involvement groups during the intervention's planning stage, may help to provide a clearer understanding of the population's needs, and how these needs can be met. In the present NHS context, organisers must carefully consider the relative advantages and disadvantages of loaning vs. not loaning equipment. The cost of loaning the equipment needs to weighed against the cost of participants *not* participating in virtual group interventions through lack of access to equipment. Conclusions could then be made as a result of each cost-benefit analysis as to whether it is advantageous to loan, or whether alternatives (such as in-person groups) are more economical or suitable in a local context.

This review highlighted that technical issues may arise even for experienced users. Intervention organisers should not overlook the possibility of technical problems arising during interventions, and should offer technical support to participants, and to facilitators if appropriate. Resolving technical problems

quickly may minimise distractions and disruption to participants and may reduce the impact of technical problems on the group dynamic.

Understanding nonparticipation

Very few studies included in this review reported on barriers to accessing virtual interventions, and reasons for dropout, which is likely to be because these individuals are highly difficult to access. Clearer, more extensive reporting of reasons for attrition has been recommended in previous systematic reviews on group interventions, demonstrating that this problem is not unique to virtual group interventions.(16) The virtual delivery of the interventions in this review perhaps means that there might be a greater number of reasons for attrition, for instance technical problems, or lack of confidence using technology. This means that it is even more important that future reports on virtual group interventions are explicit about the reasons behind attrition. If reasons for attrition are made clear, ways to retain participants within virtual groups may be easier to establish, and recommendations can be made to reduce attrition in future.

Similarly, reasons for participants choosing not to participate in a virtual group intervention should be explored where possible, and should be reported in any intervention summaries or relevant research outputs. Without doing this, it is impossible to ascertain what could be changed to increase potential participants' motivation, opportunity, or capacity to enrol onto an intervention. Likewise, if a participant wishes to take part in another type of intervention, their decisions should be respected, and alternatives offered (e.g., provision of asynchronous information or support) where possible. In any case, participants enrolling on the most suitable intervention for them should be considered a priority by intervention designers and providers, including healthcare professionals.

Recommendation and further details
Developing a positive group dynamic
Facilitators should use techniques to facilitate positive group dynamics and shared social identity
Interventions should have clear rules, including on microphone and camera usage
Safeguarding
Designers and organisers should train facilitators to recognise and report safeguarding concerns in virtual groups
Privacy of participants should be prioritised; participants should be made aware of privacy-related group rules
Improving accessibility
Designers and organisers should consider whether loaning equipment, such as laptops, to participants would increase health equity
Organisers should be prepared to offer technical support to participants and facilitators where feasible
Understanding nonparticipation
Reasons for non-participation, including non-enrolment and attrition, should be explored and reported in write-ups of interventions
Participants should be given appropriate information and support to make a decision about the best type of intervention for them

Table 7: Recommendations for future interventions from this systematic review

2.4.5: Strengths and limitations of the current review

One strength of this review is its systematic nature – to the authors' knowledge, no other systematic review has been conducted to explore virtual group interventions. A recent scoping review was conducted, which featured virtual group interventions amongst other types of intervention delivery, and did not solely include primary studies, featuring other reviews in the included studies.(147) However, the current review's rigour and specific focus on primary research on virtual groups is a relative strength of this work.

In this review, all papers exploring engagement with, and experiences of, virtual group interventions for common chronic condition prevention and/or management were eligible for inclusion. On one hand, this was a strength in that it allowed for a broad range of findings to be collated on this relatively under-researched topic. However, the heterogeneity of included studies meant that it was difficult to directly compare the interventions. There were also small numbers

of interventions for each included condition, which meant that it was difficult to deduce whether interventions for the same condition were engaged with or experienced in a similar way. For example, although this review included seven interventions for weight management, only two of these studies featured interviews exploring participants' experiences, one included a short survey on experiences, and only four measured engagement. This limits the strength of the conclusions of this review, because the lack of similarity between study data limits the conclusions that can be drawn.

This review was limited to common chronic physical conditions that could be effectively prevented or managed using a virtual group intervention to initiate behaviour change. This means that interventions for communicable, genetic, and all mental health and cognitive conditions were excluded. There is, however, a wide range of evidence evaluating virtual group interventions and support groups for these conditions, suggesting that they can provide effective support and self-management strategies for a range of conditions, which may mean that some of the findings from the current review might be generalisable to these.(72,76,148–150) Understanding what can lead to improved engagement and experiences of virtual group interventions would potentially be deepened by incorporating interventions for a wider range of conditions.

This review included papers on studies conducted both before and during the Covid-19 pandemic. It has been demonstrated that people's attitudes and behaviours towards utilising communication technology changed markedly during the pandemic. In lieu of connecting to people in-person, many people used videoconferencing technology, some for the first time, for a variety of purposes. This technology is similar to the technology utilised by the interventions featured in this review. Also, in the initial periods of Covid-19-related restrictions, healthcare systems changed rapidly to adapt to the pandemic, which included the introduction of video consultations to replace in-person sessions. This means that intervention organisers and facilitators may have been more used to, and prepared for, delivering and taking part in virtual group interventions after the peak of the pandemic. This may have direct implications for engagement and experiences with virtual interventions that took place before versus during or after

the pandemic, which this review did not explore fully. To ascertain whether this is the case, future research could compare the engagement and experiences of participants in interventions that took place before the pandemic, and after the pandemic, to see if and how they changed.

This review explored engagement with interventions. However, most participants in included studies had self-selected to take part in a virtual group, which may have influenced the review's overall findings. This is because the participants who already had some capability, opportunity, or motivation to engage with a virtual group may have been more likely to self-select and enrol in a study. One set of voices that did not feature in the current review was that of the individuals who were invited to participate, but did not. This includes those who declined to participate in the intervention at the point of consent as well as those who dropped out of the intervention during the course of the study. This is a limitation of the current review because it means that it is difficult to determine which features of the interventions caused individuals to choose not to participate. Exploring the experiences of those who chose not to participate in virtual group interventions is an important next step for future research.

2.5: Conclusions

Virtual group interventions for preventing and/or managing chronic physical conditions had high engagement, which did not appear to be clearly linked to participants' personal characteristics. Barriers to engagement were reported, which included scheduling conflicts, lack of access to equipment, and distractions. Technical problems did not generally disrupt interventions. Loaning participants equipment to take part in interventions was perceived positively, but more detailed, larger-scale research is required to determine how this influences access and engagement, and in which population groups. Generally, participants felt safe in their virtual groups, and felt like they could comfortably share their experiences. Facilitators were deemed a key part of interventions by participants, along with social support, sharing with others, and comparing to others, which is similar in in-person group interventions. However, some social limitations were

present within virtual groups, such as lack of camaraderie, and some participants preferred in-person groups, for reasons including a perceived lack of social connection in virtual groups.

Going forward, this review suggests several recommendations which should be viewed with caution in light of the recognised methodological limitations of the included studies. Organisers and facilitators of virtual group interventions should strive to facilitate a positive virtual group dynamic, which includes fostering a shared sense of social identity. Safeguarding of participants should be prioritised, with facilitators given training on how to identify and report concerns. Loaning technology to participants should be considered carefully, as should the provision of technical support to participants and facilitators. Participants' reasons for not attending, or not participating in, virtual group interventions, should be explored and reported. Overall, virtual group interventions have been engaged with and experienced positively by participants for a range of chronic physical conditions and this review has identified some areas for improvement in the future.

Chapter 3: “A bit of a learning curve, but I soon got used to it.” A qualitative study exploring participants’ and facilitators’ experiences of virtual group interventions in healthcare

3.1: Introduction

The focus of this study is on virtual group interventions that aim to support disease prevention and self-management for people at risk of developing or with existing chronic conditions, as well as general health promotion.

Whilst Chapter 1 provides background on why virtual group interventions are an important area of research to explore, there are specific reasons why conducting a qualitative study in this area is important. There have been a growing number of studies which have explored this mode of healthcare delivery, and this study builds on Chapter 2, the systematic review examining participant engagement and experiences of virtual group interventions.(151) Key messages from this review, which informed the focus of the present study, included the importance of facilitating a positive group dynamic to enable the building of rapport and bonding within participant groups, as well as the importance of clear expectations surrounding practical aspects of running virtual group interventions, such as group rules and facilitator training. This review also identified no studies where facilitator *and* participant views were explored for the same intervention. This study is therefore justified on the basis of the gaps in the literature identified by the review, as outlined.

The target population of the present study was participants involved in virtually-delivered group sessions as part of programmes such as the NHS Diabetes Prevention Programme,(152) which, like some other programmes, in some areas switched from face-to-face to online delivery using videoconferencing software during the Covid-19 pandemic and continues to be offered in this format. Other populations who don’t have access to these programmes, such as those who don’t have access to the internet, were not involved in this study, due to the scope of the master’s project for which this study forms a part.

3.1.1: Rationale

As outlined in previous chapters, alongside a rise in the prevalence of chronic conditions, the Covid-19 pandemic has exacerbated existing strains on NHS finances and resources.(11) When combined with the increased demand experienced in recent years, this has increased pressure on healthcare staff, and workforce retention and staff wellbeing and burnout have become key issues facing many healthcare providers.(12–14) Many staff are expected to leave their professions in the near future, with one survey study finding that 70% of GPs in the South West of the UK had planned to leave patient-facing care, reduce their working hours, or take a career break.(15) Therefore, it is vital that new interventions designed to improve participant health do not exacerbate this issue, and are time- and resource-efficient for healthcare professionals.

Virtual group interventions have the potential to support the prevention and management of a wide range of chronic conditions in an effective and efficient way.(61,66–69) This is relevant and important, considering the current financial and resource-related challenges facing healthcare providers, as justifying the introduction of new interventions in a time of acute challenge is extremely difficult.

Understanding participants' and facilitators' views on virtual group interventions as an alternative or additional means of supporting chronic disease prevention and management was the primary aim of this study. During PPI consultations, it was agreed that it is important to understand what works for participants in, and facilitators of, these interventions, and what could be improved. Also, this may help to further understanding of the behaviour change mechanisms that are active within virtual group interventions and shed light on how these can be more effectively supported. It has previously been demonstrated that behaviour change mechanisms differ between different intervention formats.(29,56) However, as outlined in previous chapters, it is not yet understood whether and how behaviour change mechanisms that take place in virtual group interventions might differ from those in other intervention types.

There have been numerous small pilot and feasibility studies conducted to examine experiences of virtual group interventions.(61,66–68) These have explored aspects of intervention design, attendance, and fidelity of delivery.

However, qualitative studies to enhance understanding of the benefits, drawbacks, and potential behaviour change mechanisms active in these interventions, especially from the perspectives of participants *and* facilitators, are scarce. For example, of the qualitative studies included in the systematic review featured in Chapter 2, none of these explored the perspectives of both participants and facilitators. Without such work, it is difficult to ascertain how these interventions work, and for whom, and to identify ways in which they can be optimised in the future, both from the perspective of those leading and taking part in sessions.

3.1.2: Aims and objectives

This study therefore aimed to:

- Increase understanding of the experiences of participants and facilitators involved in virtually delivered group-based health interventions, specifically:
    - To identify perceived benefits and drawbacks of virtual group delivery
    - To explore perceived mechanisms of behaviour change present in these virtual groups (i.e., features of the interventions that were perceived to facilitate behaviour change in participants)

To achieve this, the objective of the study was to:

- Conduct qualitative online interviews with up to 15 individuals participating in or facilitating virtual group interventions, such as the virtually delivered arm of the NHS Diabetes Prevention Programme.

3.1.3: Research questions

Research question 1: What are the participant and facilitator experiences of advantages and disadvantages of virtual group health interventions?

Research question 2: Which behaviour change mechanisms do participants and facilitators perceive to take place in virtual group health interventions?

Research question 3: How can virtual group health interventions be optimised for future delivery?

3.1.4: Theoretical underpinning of the project

Virtual group interventions to support prevention and management of chronic conditions aim to facilitate health-related behaviour changes in participants. Some concepts from the literature about mechanisms or processes of change in behaviour change interventions will be used to inform this study. Behaviour change mechanisms that operate in groups have been shown to be different to those in individual interventions.(29) These may also differ in virtual groups or their operation may be negated or altered by the online delivery format. In order to elucidate the mechanisms that operate in these interventions, observations of virtual group interventions could be taken, as has been done in previous studies on this topic.(61,69) However, this approach is resource intensive and practically difficult, so interviewing participants and facilitators about their perceptions of mechanisms was the method chosen here to provide valuable insights into this.

This study was undertaken within the essentialist or realist framework, where experiences, meaning and the reality of participants are analysed and reported on a semantic level, under the assumption that the participants' language reflects their experience.(153)

Another important concept informing this study is the COM-B model of behaviour change(125), with elements of this model representing:

- C: capability
- O: opportunity
- M: motivation
- B: behaviour

These represent vital factors that contribute to a participant's ability to take part in an intervention, and successfully engage in self-management. They also

represent behaviours that provide facilitators with the ability to successfully lead the intervention, and support self-management in their participants. The next section explains and clarifies how these behaviours of interest apply to participants and facilitators of virtual group interventions.

Capability refers to the individual's knowledge and understanding of ways in which they can achieve behaviour change.(125) Understanding participants' and facilitators' perspectives on what could be done to help increase capability in virtual group interventions is important to enhance uptake and effectiveness of this type of intervention. For example, it would be useful to establish if there are any barriers to understanding how to use the technology to enrol and engage in virtual group sessions in a way that is conducive to individual behaviour change for participants. For facilitators, it would be useful to explore how they perceive their capacity to use the technology to successfully deliver intervention content.

Opportunity refers to an individual's access to the resources that they require to participate in the intervention and to change their behaviour.(125) Here, for example, this may refer to the access to technology required for engaging with virtual group sessions, such as a computer, smartphone, or internet connection. Understanding participants' and facilitators' experiences of these types of interventions could help identify potential measures that could be put in place to increase accessibility of future interventions and ways to explore capitalising on opportunities for behaviour change within them.

Motivation refers to an individual's drive and desire to take part in, or in the case of facilitators lead, an intervention and work to achieve behaviour change.(125) Understanding the perceived advantages and disadvantages of participating in these interventions, and mechanisms for enhancing motivation for behaviour change within them, will help future designers and facilitators to optimise features of these interventions that support recruitment, retention and behaviour change amongst future participants. Specifically pertaining to virtual group interventions, motivation is a critical factor in determining participants' adherence to their intervention, and buy-in of intervention facilitators. For example, if participants lack motivation to attend their sessions, they may be less likely to adhere to any

self-management behaviours outside of sessions, such as engaging with physical activity or a specific diet.

Whilst the COM-B model of behaviour change applies to participants, in this case elements of the model were also applied to those facilitating the sessions. These individuals also must have the capability, opportunity, and motivation to deliver these interventions effectively, for example, by ensuring provision of adequate training, technology and resources.

The figure (**Figure 2**) below provides a visual representation of how the COM-B model frames some of the issues that were explored in this study.

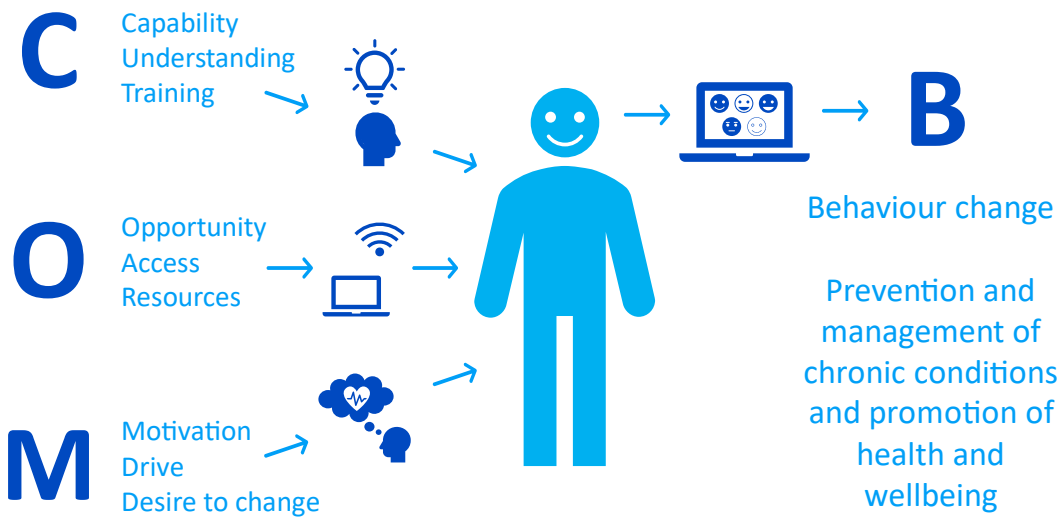


Figure 2: Visual representation of how the COM-B model frames some of the issues that were explored in this qualitative study

3.2: Methods

Task	Researcher contributions
Conducting scoping searches to find virtual group interventions	CR
Writing protocol	CR
Editing and finalising protocol	CR, AB, JRS
Writing ethics application	CR
Editing and submitting ethics application	CR, AB, JRS
Recruiting participants	CR
Interviewing participants	CR
Transcribing interviews	CR
Analysing findings	CR
Finalising findings	CR, AB
Write-up	CR
Reviewing write-up	CR, AB, JRS

CR: Ms Charlotte Reburn; AB: Dr Aleksandra Borek; JRS: Dr Jane R Smith. AB and JRS are supervisors of CR.

Table 8: List of researcher contributions to this qualitative interview study

3.2.1: Study design and justification

See *Table 8: List of researcher contributions to this qualitative interview study* for details of researcher contributions. Data was collected through in-depth, semi-structured interviews using real-time videoconferencing. Semi-structured interviews were chosen because they allow for the interview to be guided, in part, by the interviewees, maintaining focus on the key topics of relevance whilst still allowing the interviewees to fully articulate their opinions, thoughts and feelings without feeling restricted or constrained. It was thought that this would allow rich information to be gleaned from interviewees in a limited time period, to minimise

the research burden. Interviews were chosen instead of focus groups as they were logistically easier and quicker to organise in the limited time available to conduct the research. Interviews are also more suitable to explore individual experiences and views (the focus of this study), rather than exploring shared and divergent views and norms for which focus groups would be more appropriate.

Interviews in studies about interventions are particularly suitable to develop in-depth understanding of people's experiences and views.(154) These interviews took into account that each individual will have their own perception of "reality", and interpretation of these perceptions will further understanding of shared and contrasting experiences.(31) Gaps in the literature largely centre around stakeholder experiences of these interventions, including what people think works about these interventions, and how people perceive them to work, which this study aims to explore. As previously identified by the systematic review, gaps also include an exploration of experiences of both facilitators and participants, as well as issues surrounding social interaction and safeguarding in virtual groups.

3.2.2: Public and Patient Involvement

Acceptability of the research: Before the study began, a PPI group were consulted to determine whether this research was, in their experience and opinion: relevant, important, useful, clear, and concise. In this meeting, the members of the group commented that, because the mode of healthcare delivery in question was so novel, and therefore interviewee opinions and experiences were crucial, it would be an important piece of research to undertake. They commented that this research was particularly important because they anticipated that this type of intervention may not be suitable for all users.

Design of the topic guides: PPI contributors were asked which topics surrounding virtual group interventions were important to them, and what they would consider to be important when participating in a virtual group intervention. This helped to ensure that the questions in the interview were clear, concise, and relevant to the important topics identified.

3.2.3: Participants

Study participants were asked to ensure they were in an appropriate quiet space of their choosing away from others, in order to conduct the interview remotely. Giving study participants the choice to be contacted by video call or voice call was important to allow participants flexibility according to their needs and preferences, and to make contributing to the study as easy as possible.

Eligibility criteria

The target population comprised participants and facilitators previously or currently involved in virtual group health-promoting interventions.

Inclusion criteria

Targeted intervention participants were adults from any background who had participated in sessions of a UK-based health intervention, such as the virtually-delivered NHS Diabetes Prevention Programme (participants could have participated in any number of virtual group sessions, as an alternative to or in addition to other formats).

Facilitators were adults with or without professional training, from any background and with any level of experience who facilitated sessions of a UK-based virtual group intervention as above (any number of sessions).

There were no restrictions on inclusion based on gender, race, ethnicity, socioeconomic status, or geographical location within the UK, but participants of this study needed to have adequate English language fluency to take part in a video or voice-only interview, or have their own interpreter available to support participation. It was assumed that those who had taken part in virtual group programmes had appropriate technology and adequate mental capacity to take part in an interview of this nature.

Exclusion criteria

Children under 18 participating in virtual group programmes, people participating in such programmes provided outside the UK, and people without adequate English language and without access to an interpreter were excluded.

Adults participating in or facilitating virtual individual or face-to-face group interventions but who were not involved in any virtual group sessions, or where the interventions targeted conditions such as mental health problems, learning difficulties, or cognitive conditions, were also excluded.

Size of sample

The study aimed to recruit up to 15 study participants in total, with one interview taking place with each study participant. As the main aim of the study was to increase understanding of the experiences of individuals participating in or facilitating these interventions, it was important to have a sample size that was large enough to obtain findings from a broad range of voices, whilst being manageable to achieve sufficient depth of conceptual understanding within the constraints of this programme of student research, hence the sample size was reflective of the conceptual depth required.(155) This sample size is in line with other similar studies in the literature, and it was anticipated that this would provide a suitably broad range of experiences for this study, taking into account anticipated diversity in the sample and degree of participation in virtual group sessions.(69,97,98)

Sampling technique

To avoid confusion, in the following sections of this chapter, the term ‘interviewees’ comprises both programme facilitators and programme participants who took part in interviews for this qualitative study.

Convenience sampling was used, since it was anticipated that there were likely to be small numbers of potential interviewees from each intervention, especially within the very limited time frame within which this study was conducted.

This approach to sampling was justified by the fact that all eligible interviewees were involved in some way in participating in a virtual group intervention, so there was likely to be a degree of commonality in experiences. These interventions are also relatively novel, so sampling from within known programmes was viewed as both convenient and useful for delivering suitable findings to generate new recommendations, especially given the time constraints and aims of this study.

Sample identification

Initially, scoping searches took place to identify potential virtual group interventions that could be approached to support recruitment of participants and facilitators for interview. After this scoping exercise, it was decided, with the guidance of the supervisory team, to focus the bulk of recruitment efforts on two different programmes which were both accessible to this research team, and different from one another. These programmes were the virtually-delivered NHS Diabetes Prevention Programme (NHS DPP), delivered on behalf of the NHS by a private company, and the Healthy Parent Carers (HPC) programme, delivered by parent carer charities/non-profits following training by the intervention developers at the University of Exeter.(156,157)

The version of the NHS DPP featuring in this study was focused on managing gestational diabetes.(156) Participants are referred to the programme by their GP, and receive group education on managing gestational diabetes over several months. HPC is a programme for parent carers of children with life-altering conditions, with the aim to promote the parents' own health and wellbeing.(157)

Other interviewees were sought through social media networks and targeted emails (see below).

Recruitment

Information about the study was initially emailed to NHS DPP and HPC participants and facilitators by the company delivering the NHS DPP, and by the University of Exeter-based team working with HPC providers. These emails to

potential interviewees contained basic details of the study, and potential interviewees were told to get in contact with CR if they were interested in taking part. These emails contained the advertising poster (**see Appendix 10: Participant and facilitator recruitment poster,** and **Appendix 11: Emails and texts to advertise the study**) and the participant information leaflet (see **Appendix 12: Participant information leaflet**). The poster was brief, and contained basic information about the study, whereas the leaflet contained details about the aim of the study, the background, why they were eligible, and what they would be required to do if involved in the study, as well as who to contact if interested (CR's role and email address). Potential interviewees from the NHS DPP were also sent a brief text message from the organisation with a link to more information (see **Appendix 11: Emails and texts to advertise the study**). In addition to these emails and text messages, CR was also invited to attend 2 NHS DPP sessions, in order to advertise the study to potential interviewees and answer any questions. This method of recruitment and interviewee identification was chosen because programme teams were already established and were likely to be trusted contacts with whom participants and facilitators were familiar.

In addition, social media adverts containing the same information as the emails and texts above were uploaded to the following platforms: a) Facebook, on community groups; b) Twitter (Retweeted 10 times, viewed a total of 1,290 times), c) LinkedIn, on personal page; and d) WhatsApp, on various community groups.

The study was also advertised to the 130+ members of the Society of Academic Primary Care Digital Technology Special Interest Group, via email. Similarly, the study was advertised to the 100+ members of the Exeter Collaboration for Academic Primary Care, via email. In both cases, emails were sent with a request to pass on to suitable networks and potential interviewees. The study details were also included in the staff bulletin for the University of Exeter, which is sent to over 5000 people.

The authors of the 3 UK-based studies included in the systematic review were also contacted, to ask if they could advertise the study amongst their participants and networks. Diabetes UK, Diabetes UK Exeter and District, and the Somerset Maternity Voices Programme were approached by email asking if they would be

able to send the study details to their networks. The study details were also emailed to a representative of the NHS DPP in Cornwall. This wide-ranging approach was justified due to the unprecedented delay in acquiring ethics approval, leaving limited time for analysis and write-up of this project (see **Appendix 13: Ethics timeline**). For more details on the results of this recruitment approach, see ***Error! Reference source not found.***.

Those interested in the study were asked to contact CR by email. On receiving expressions of interest, CR then emailed potential interviewees with the Participant Information Sheet (see **Appendix 14: Participant Information Sheet**), asking them to confirm eligibility, and request their availability for an online video or voice-only interview at a convenient time for the interviewee.

Participant identifiable information

The names of potential interviewees as given by the interviewees themselves were visible to the research team after they emailed CR to express interest in the study. This information was stored securely on a secure SharePoint only accessible to the study team, and was deleted at the earliest opportunity (see **Data storage**). The identifiable information of potential interviewees who did not consent to interviews was deleted after non-consent was confirmed. Basic demographic information was collected at the end of the interview (see **Data Collection,** below).

Consent

Potential interviewees received a participant information sheet detailing further information on the background, aims, and what to expect of taking part in the study. This included topics to be discussed, and any potential risks, however minimal (there were no risks anticipated for participation in this study). See **Appendix 14: Participant Information Sheet** for more details. They also had the opportunity to have a telephone call or further email correspondence with CR about further details of the study, and to have their questions answered.

Alongside the participant information sheet was a secure link to an online consent form (on the platform Qualtrics), for interviewees to complete, and submit to the research team prior to the start of the interview as a formal indication that they understood the concept of the project, what was expected of them, and that they wished to take part. For more information, see **Appendix 15: Consent form**.

Interviewees were also asked at the beginning of the interview to confirm verbal consent for their interview to take place and to be audio-recorded.

3.2.4: Data collection

CR conducted semi-structured interviews with all interviewees using two topic guides: one for intervention participants and one for facilitators. Interventions could have been prevention or management-focused, and facilitators and participants did not need to have taken part in the same interventions as one another. Participants were interviewed once, with the interviews lasting up to one hour. The interview guides were developed in consultation with a patient and public involvement (PPI) group. Members of the PPI group were asked to name key topics surrounding virtual group interventions that they considered important topics for further research, and what they believed others would consider to be important when participating in or facilitating a virtual group intervention. This helped to ensure that the questions in the interview topic guides were clear, concise, and relevant to the focus. The guides were developed by CR via an iterative process, also involving consultation with other members of the project team (AB, JRS). This helped to ensure that the findings would remain as relevant and useful as possible for addressing the research questions and informing recommendations for future interventions.

The interview guides focused on interviewees' reasons for choosing to take part in/lead a virtual group intervention; barriers and facilitators to taking part in virtual group interventions; benefits and drawbacks; and perceived mechanisms of action for behaviour change. For more information, see **Appendices 16** and **17: Participant and Facilitator Interview Guides.**

The interviews were recorded using Zoom videoconferencing's inbuilt recording software. The audio recordings were transcribed verbatim. Data on basic demographic characteristics of interviewees was also collected in order to contextualise the findings. A simple verbal questionnaire featured at the end of the interview guide, asking for information such as age and gender.

Interviews were remote, and so interviewees did not have to travel to interviews. Therefore, interviewees were not expected to incur extra expenses due to participation. As an expression of gratitude for giving up their time to take part in the study, interviewees were each given a £25 Amazon voucher upon completion of the interview. This was not used as an advertising incentive to take part in the study. This was in-line with the University of Exeter's recommendations for compensation for taking up to an hour of time to participate in a non-invasive research study.(158)

3.2.5: Data storage and management

Researchers CR, JRS and AB had direct access to the data from this study. All complied with the requirements of the UK General Data Protection Regulation (GDPR) Act with regards to the collection, storage, processing, and disclosure of personal information and upheld the Act's core principles.(159)

All identifying information (e.g., names and contact details) used for arranging interviews was stored separately from research data in a password-protected file on a password-protected University of Exeter SharePoint site, accessed via an encrypted University computer which had a 2-stage login system installed for enhanced security. This information was set to be destroyed three months after completion of the study. Audio recordings were transferred to a password-protected folder on a University of Exeter password-protected SharePoint site as soon as feasible after the interview. Recordings were transcribed using Microsoft Word by CR and the audio files were deleted as soon as transcripts had been checked for accuracy. All research data (i.e., deidentified transcripts and sample characteristics) were stored securely on an encrypted password-protected SharePoint site accessed via a University computer as above. De-identified research data was made available to access by the other members of the

research team on request, and any documents that were transferred between protected devices were password-protected. At the start of this study, it was decided that research data and consent forms would be archived at the University of Exeter for 7 years, in accordance with GDPR regulations. During this time, this data will be stored in a secure folder on a password-protected SharePoint site. After this time, it will be destroyed by data destruction software.

Interviewees' confidentiality was ensured by assigning a numerical identification number following consent – with interview recordings and transcripts labelled with this ID number. Transcripts were deidentified by removing identifiable information, such as names or places. The identities of the interviewees did not appear on any documents from the post-interview stage, only in interviewee correspondence and pre-interview organisational materials, including consent forms. This was made clear to interviewees in advance of the interviews.

3.2.6: Data analysis

Data was analysed using framework analysis in NVivo (Version 14, QSR International 2023), a qualitative data management software. See **Appendix 18: Examples of qualitative analysis of transcripts on NVivo** for samples of this analysis and a list of codes. After immersion in the interview transcripts, achieved by re-reading transcripts and noting down initial thoughts, interview transcripts were uploaded to NVivo for coding. An initial coding framework was developed using the themes generated by the systematic review, described in Chapter 2, and applied deductively to code the transcripts. Then, the data within each theme was re-coded using more detailed, inductive codes. Next, inductive codes within each theme were reviewed to check that they fit in with the initial (deductive) themes and the data corpus as a whole. The names of some themes were changed slightly from the names featured in the systematic review, in order to reflect the unique nuances of the data in this study, and effectively capture the story told by each theme.

Initial intentions were for this analysis to be reflexive thematic analysis, as described by Braun and Clarke.(160) Reflexive thematic analysis involves the

researcher recognising their own position within qualitative research, and their own assumptions, when generating themes from the data, and considering these when immersing themselves in the data and reflecting on the themes that they have generated.(160) For example, if undergoing full reflexive analysis as part of this project, the author may have viewed the findings through many different lenses, such as my method of data collection (i.e., video call interviews); or my own positioning in relation to the participants (i.e., as someone who has lived experience of living with chronic conditions, but who has never taken part in a group or virtual intervention). However, the time taken to obtain ethical approval for this study meant that full thematic analysis was deemed to be unfeasible in the time remaining after recruitment. For full details, see **Appendix 13: Ethics timeline**. It is acknowledged that whilst thematic analysis may have gleaned greater richness from the findings, and led to more fully informed recommendations, the framework approach taken by this study was viewed as a suitable, efficient alternative that allowed for this study to build upon the findings of the systematic review described in Chapter 2, and for the two studies in this thesis to map more fully onto one another.

3.2.7: Ethical considerations

This study was granted ethical approval by the NHS Research Ethics Committee on the 27th of June 2023 (REF 23-NI-0093). (**Appendix 19: Ethics approval letter**).

Benefits to interviewees

There was no direct benefit to interviewees of taking part in this study. However, as well as being able to discuss their experiences of participating in and facilitating this type of intervention in detail, interviewees helped to shape recommendations for the future optimisation of these programmes. Implementing these recommendations will help to ensure that these interventions operate optimally for both participants and facilitators to achieve behaviour change.

Risks to interviewees

Although risks to interviewees were minimal, there was a potential for interviewees to become emotional, or disclose sensitive information when recalling their experiences. The comfort, safety and ease of communication of interviewees was a priority. The interviewer minimised the risk to interviewees' wellbeing by ensuring that interviewees were made to feel comfortable to share their thoughts and feelings. This was achieved by CR enquiring as to the interviewees' wellbeing before, during and after the interview process, creating an environment of trust between the interviewer and the interviewee. Looking for verbal and nonverbal cues of interviewee discomfort was also an important aspect of this. Interviewees were also offered breaks in the middle of the interview if necessary.

There was a short introduction before the interview to make interviewees more comfortable, and CR communicated that, at any point, interviewees could ask for the interview to be paused or stopped, for the recorder to be stopped, to not answer a question, or to take a break. With an awareness of the importance of interviewees' unique perspectives and experiences, interviewees were reminded that they could be as honest as they wished. CR also reminded interviewees that she had no connection with their intervention.

Risks to researchers

Risks to the researcher were minimal for this project, especially because interviews were conducted remotely. However, if the conversation were to stop being professional, causing the researcher to feel uncomfortable, the researcher was fully entitled to politely draw the conversation to a close. The researcher would then have been able to debrief with the research team members after the interviews when needed – the need for this did not arise.

Peer review

The peer review conducted for this project was proportionate to the project's size. Because the project was small and low-risk (no sensitive topics anticipated), the peer review reflected this, with one reviewer who was based at the University of Exeter. This reviewer is an expert in qualitative study design, and is also conducting research in a similar area (online communities for health). See **Appendix 20: Peer review form** for the final peer review.

3.3: Results

Ten interviewees were recruited in total (see Error! Reference source not found. **3** for more details), six were programme participants, and four were programme facilitators. Five participants were from Healthy Parent Carers (HPC), two from the NHS Diabetes Prevention Programme (DPP), and three from pain management/MS programmes. HPC is a programme for parent carers of children with life-altering conditions, with the aim to promote the parents' own health and wellbeing.(152) Over a course of weekly sessions, 6-12 participants discussed methods through which to improve their health and wellbeing with peer facilitators who themselves were parent carers. The version of the NHS DPP featuring in this study was focused on managing gestational diabetes.(151) With up to 30 participants in one virtual group, participants received group sessions on managing their gestational diabetes over several months, led by several trained facilitators with specialist knowledge on key areas such as diet and physical activity. The three pain management/MS interventions were all separate interventions, and broadly focused on self-management of symptoms, such as recognising and managing flare-ups, and the importance of rest and physical activity.

This sample was below the maximum sample size of 15 participants that was anticipated during recruitment, and this arose from the fact that after a certain point in recruitment, all of the new potential interviewees coming forward were from the same intervention (HPC). It was therefore deemed unnecessary to continue recruiting from this intervention, given the time constraints facing this

project, as well as the wide range of findings already gleaned from the ten interviewees. All interviewees were female, and aged between 25 and 54 years. See **Table 9** for more demographic details of the interviewees. Interviews lasted for an average of 50 minutes, ranging from 38-60 minutes.

Interviewees' experiences of virtual group interventions are reported below within 4 broad themes, based on the themes from the systematic review featured in the previous chapter: **1)** Participant attendance and engagement; **2)** Barriers and facilitators to engaging with interventions; **3)** Experiences of intervention features; and **4)** Experiences of group interactions in virtual groups.

After reading through the transcripts and developing initial analyses, it was decided that the original theme "Barriers to attending/engaging with sessions" should be altered to include facilitators to engagement, too, because this was a key point raised by interviewees. Similarly, in this study, the original theme "Experiences of virtual group technology" was combined into the theme discussing barriers and facilitators, as interviewees generally discussed technology in the context of technology acting as either a barrier or facilitator to engagement. See Error! Reference source not found.**4** for an outline of how these themes stemmed from one another. See **Table 10** for a summary of themes, presented using the themes from the systematic review as a basis for their order. Each theme will be presented in this order below, with illustrative quotes.

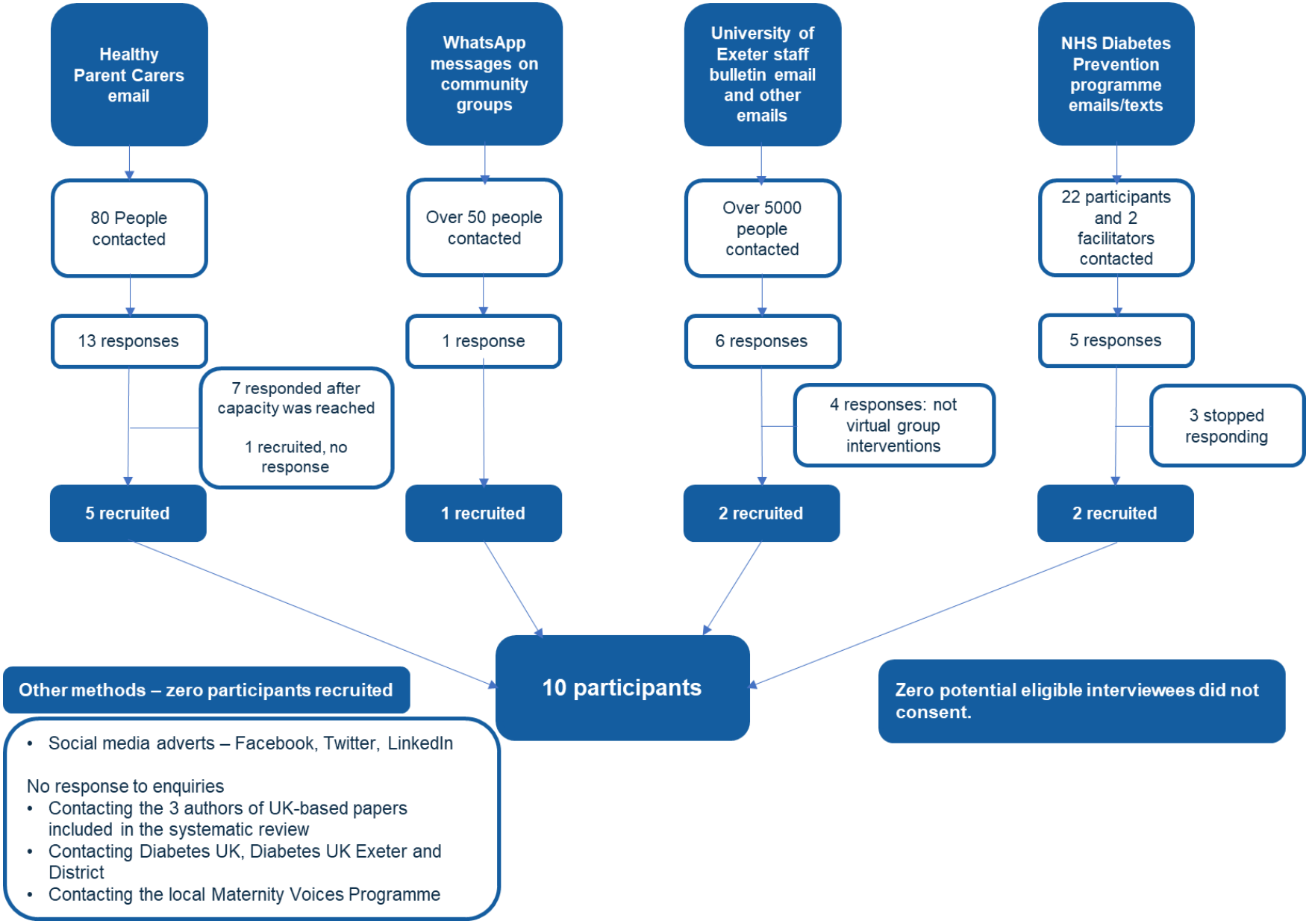


Figure 3: Detailed recruitment process for this qualitative study

Interviewee number	Age	Facilitator or participant	Type of programme	Place of residence	% sessions attended	Description of company	Role in company	Time in role	Level of experience
1	25-34	Participant	Pain management	Suburban	80%	N/A	N/A	N/A	N/A
2	45-54	Participant	HPC	Rural	100%	N/A	N/A	N/A	N/A
3	25-34	Participant	MS management	Rural	100%	N/A	N/A	N/A	N/A
4	35-44	Participant	HPC	Urban	100%	N/A	N/A	N/A	N/A
5	35-44	Participant	NHS DPP	Suburban	90%	N/A	N/A	N/A	N/A
6	35-44	Facilitator	HPC	Rural	N/A	Non-profit	Service manager	5 years	10+ years
7	45-54	Facilitator	HPC	Suburban	N/A	Non-profit	Director, family support manager	4 years	10+ years
8	35-44	Participant	Pain management	Urban	80%	N/A	N/A	N/A	N/A
9	35-44	Facilitator	NHS DPP	Rural	N/A	Private	Engagement lead	1 year	3 years
10	35-44	Facilitator	HPC	Rural	N/A	Non-profit	Communi-cations and engagement co-ordinator	7 years	7 years

Table 9: Overview of interviewee characteristics

Figure 4: How themes from the qualitative interview study built upon themes from the systematic review

3.3.1: Participant attendance and engagement

Overall, participants reported attending most of their sessions. Facilitators commented on generally high retention levels throughout their sessions, but noted that some participants couldn't attend sessions due to other commitments, including hospital appointments.

> "*I have to say, I was absolutely shocked by how many people I retained throughout the whole programme*." Interviewee 9, 35-44, NHS DPP facilitator.

Where this was the case, facilitators acknowledged that these participants often wanted to take part in the sessions, and wished to be involved in a future iteration of the intervention.

> "*Most of them still wanted to continue with the programme, but that day, that time, just wasn't convenient.*" Interviewee 9, 35-44, NHS DPP facilitator.

3.3.2: Barriers and facilitators to engaging with interventions

A small number of non-technological barriers to engaging with the interventions were identified by interviewees. These included language barriers, and mental health issues, as well as other family circumstances. These appeared to be barriers to engaging during sessions, preventing individuals from fully engaging with conversations with others, or from interacting with their fellow participants in a group setting.

> In reference to language barriers, one interviewee commented that it is assumed that participants: "*Speak English in a very confident way, because if not, then you may get overshadowed, and one person maybe kind of lead the conversation. So there is that tendency*. […] *Give these people extra time to communicate, if they're confident, and write in the chat to follow up with them and get that feedback.*" Interviewee 4, 35-44, HPC participant.

> "*There was a lady that had mental health issues, and she struggled, she struggled to be in that kind of mind space, I suppose, and even though it was virtual, to be in the room with that many people*. […] *There was* [also] *a lady who had learning differences herself that struggled to use… because we use Teams rather than Zoom as an organization, and she struggled to use Teams*." Interviewee 6, 35-44, HPC facilitator.

Most barriers to engaging with intervention sessions arose from problems with the technology required to take part in the sessions. Some participants accessed the interventions on their mobile phones, rather than computers or tablets, which reduced the functionality of the videoconferencing software.

> "*I just had my phone so that was a little bit strange, a bit of a learning curve, but I soon got used to it."* Interviewee 2, 45-54, HPC participant.

> "*On the iPhone or Android, you wouldn't have as many of the different tools, so certain things... Obviously it's going to be a smaller screen, so you're not going to be able to see it in great detail, but you've still got access.*" Interviewee 9, 35-44, NHS DPP facilitator.

Sometimes, technical problems were experienced during sessions, and facilitators tried to help where possible. Some participants were frustrated by these technical problems, but mostly, these technical problems didn't cause significant inconvenience to participants.

> "*Most of the sessions, every week, we spent the first 20 minutes trying to restart the Zoom*. […] *A lot of time is wasted doing that.*" Interviewee 1, 25-34, pain management participant.

> "*Obviously, the first couple of sessions, there was technical glitches. I'm not gonna say everything went seamlessly, but actually everyone understood. It didn't really matter. Everyone who was on the course, we could make a bit of a joke of it.*" Interviewee 10, 35-44, HPC facilitator.

Different interviewees had different levels of confidence and experience with technology. Many interviewees were comfortable using the technology required for their interventions, particularly because of previous experience using similar

technology, through their studies or work. Some participants and facilitators were a bit more nervous about using the technology, but their confidence generally grew as the interventions continued.

> "*I was actually confident in using the Zoom. Because I have, you know, during the Covid time I have to use the Zoom many times.*" Interviewee 5, 35-44, NHS DPP participant.

> *"Those people who might have initially struggled, then, kind of, began to gain more knowledge and were more able to do it*." Interviewee 9, 35-44, NHS DPP facilitator.

The virtual nature of the interventions meant that the interventions were more accessible for many interviewees – for some, participating in an in-person intervention wasn't feasible because of competing priorities. Not having to travel to sessions was another commonly identified value of virtual delivery.

> "*But people like me, you know, those who are working, those who have got kids, they have like childcare. They have to do the school runs, you know. Yeah, for them… It might not be convenient to attend those, you know, sessions in the community.*" Interviewee 5, 35-44, NHS DPP participant.

> "*Because of like travel, and because of like people with chronic fatigue, it's easier to kind of open up the screen than it is to commute.*" Interviewee 3, 25-34, MS management participant.

> "*I know that if it was in-person it would have meant more time to get to the venue, so I possibly wouldn't be able to have taken part.*" Interviewee 4, 35-44, HPC participant.

Interviewees also valued virtual groups because of a perceived reduction in anxiety. This appeared to emerge due to meeting virtually, rather than meeting in-person. Similarly, it was noted that a virtual environment may be less triggering than certain in-person environments for some interviewees. Interviewees with different physical conditions also valued the ability to conserve energy and attend

the sessions comfortably. It was also noted that neurodiverse group members may prefer virtual delivery.

> "*If I was to meet those people face to face, I would have been a bit more anxious, I think*. […] *Whereas when you do virtually… I don't know – it's not as daunting*." Interviewee 2, 45-54, HPC participant.

> "*We have to be really mindful where we run the courses. So, lots of parenting courses are run in schools, for example, and people get really triggered by the school environment by the smell, by the you know, their own school journey themselves*." Interviewee 7, 45-54, HPC facilitator.

> "*If I was having an off day, and I wasn't well enough to work, but I was well enough to attend the session. I could still come bundled up in my dressing gown if I really needed to, because you're only really seen from the neck up.*" Interviewee 8, 35-44, pain management participant.

3.3.3: Experiences of intervention features

Participants perceived a variety of changes within themselves after having taken part in their interventions, including making small changes to their daily routines. Different aspects of each intervention were perceived as helpful by participants when making changes to their behaviour. This included handouts and activities, the facilitators, as well as various group-based interactions, such as sharing advice with others, and feeling accountable to others.

> "*When you've got the packs, it makes it feel a bit more like you're it doing in person.*" Interviewee 3, 25-34, MS management participant.

> "*They pushed each other on. There's somebody who'd have an idea. And they'd talk about their idea, and then another person would go:* 'Oh, do you know what? If you don't mind, I'm gonna copy you! I'm gonna do that as well.'" Interviewee 6, 35-44, HPC facilitator.

Similarly, facilitators appreciated certain aspects of their programmes, such as the structure of the intervention content, and the presence of a co-leader during their sessions.

> "*Our programme is really well-structured."* Interviewee 9, 35-44, NHS DPP facilitator.

> "*One of us would be trying to solve the technical issues, while the other one kind of carried on talking to the group, so that it was kind of a bit more seamless.*" Interviewee 10, 35-44, HPC facilitator.

They also commented on the training experiences that they had before undertaking the role of group facilitator for their interventions. This training was a positive experience for all facilitators, and facilitators felt prepared for intervention delivery after having taken part in this training.

> "[The HPC facilitator training] *was great, we were given so many opportunities to work through things, ask questions, make sure we was confident in how to deliver certain things.*" Interviewee 6, 35-44, HPC facilitator.

> "*It's very different to delivering face to face. I would definitely say I've learnt some new skills which I didn't think I had*." Interviewee 9, 35-44, NHS DPP facilitator.

Participants and facilitators also commented on several aspects of the interventions that they thought could be improved in the future. This included having more breaks (especially for pain management interventions), having consistent facilitators throughout the intervention, and managing facilitators' expectations of what participants are expected to do outside of programme sessions.

> [In reference to a lack of breaks during sessions] "*My neck and my legs are starting to hurt.* […] *you're at a pain management clinic and you're actually feeling pain* [Laughs]". Interviewee 1, 25-34, pain management participant.

"*When you get familiarised with your instructor, your confidence builds up. The group confidence builds up.*" Interviewee 5, 35-44, NHS DPP participant.

3.3.4: Group interaction

Group identity

Interviewees experienced a rapport and a sense of bonding within their groups. Some interviewees commented that the bond they felt between themselves and group members was strong, in spite of the fact that they were meeting virtually. Many different factors led to interviewees bonding, including sharing experiences, having a small group, a shared reason for being in the sessions, and the consistency of having the same facilitator leading the sessions.

> *"We vibed, and we felt that. I thought that was really amazing, that it translated across the screen.* […] [The connection was] *Just as strong, but in a different way, and it had a lasting impact on me."* Interviewee 4, 35-44, HPC participant.

> "*Because it's a small group, you do get to know people better. It's not so overwhelming. Having that small, more intimate group, I think that definitely helps.*" Interviewee 2, 45-54, HPC participant.

However, some interviewees commented that this would have been different in-person, with a perceived lack of rapport resulting from online delivery. Participants and facilitators commented that building up rapport between group members took longer in online groups compared to in-person.

> "*You obviously don't get to know people as well virtually as when you did like in person.*" Interviewee 3, 25-34, MS management participant.

> *"Definitely, the group bond took longer, but there was definitely still a group bond there at the end*." Interviewee 10, 35-44, HPC facilitator.

Some interviewees discussed contacting each other outside of sessions, including via text messaging groups and meeting up in-person. Facilitators commented on their participants' eagerness to set up social media groups and to

meet in-person. Sometimes, the online delivery meant that initiating an in-person meet up, or the formation of a social media group, took longer when compared to in-person. Participants appreciated the contact they had with their fellow group members outside of sessions.

> "*It just came across naturally in a conversation. I think I think it might have been the lady I was working with. She said*: 'Oh, wouldn't it be good if we could all get together face to face?'" Interviewee 6, 35-44, HPC facilitator.

> "*Since we've finished the group like we've got like a WhatsApp chat thing and we talk every now and again*. […] *The aim is eventually we'll kind of meet with people and stuff*. […] *I think having that like on your phone, on tap, is really useful*." Interviewee 3, 25-34, MS management participant.

Some participants expressed that they had a shared identity with their other group members, because of their shared experiences.

> "*They, kind of, do form those friendships and bonds because they know they're not on their own*." Interviewee 10, 35-44, HPC facilitator.

> "*I think after the third or fourth session we got on to calling us a tribe, little tribe of parents who'd kind of made the connections*" Interviewee 6, 35-44, HPC facilitator.

Facilitators reflected that the composition of their group, featuring members with varied experiences and different backgrounds, made a difference to the impact that the group had on members. Sometimes, the presence of some participants caused clashes between group members. However, even when personalities clashed, they still connected when they realised that they had shared experiences.

> "*They may well get on with some more than others, but when they share their experiences, everyone kind of sees… because you just see the outer side of people a lot of the time. It's not until you go beneath the surface*

that you see that everyone's struggling with something." Interviewee 10, 35-44, HPC facilitator.

"*I think I think a diverse group is probably better for delivering training and sharing information*." Interviewee 6, 35-44, HPC facilitator.

Facilitators commented that they had considered the impact of their chosen group composition on the group dynamic, and that it was positive to have a diverse mix of individuals within their groups.

"*So we have been quite mindful within our groups that… I'm going to try and politely word this… Any high-need families or those parents that you know could easily, kind of, derail a group… We've not put too many of those in. And actually, we've made sure that there are some other really kind parents with them.*" Interviewee 7, 45-54, HPC facilitator.

Modelling

Participants used the sessions to share experiences, advice, and progress with other members of the group. Participants shared stories about their lives and personal situations, relating to other participants. Most participants felt that sharing was a positive experience, as it brought them greater understanding of their own condition and of their fellow group members' conditions.

"*I was definitely reassured by the other participants that, you know, you have good days, and you have bad days.*" Interviewee 3, 25-34, MS management participant.

"*Sharing stories, so people felt less alone and isolated.*" Interviewee 8, 35-44, pain management participant.

As well as sharing experiences and advice, participants also used the sessions to share practical tips and resources with the group.

"*Asking anyone else,* 'Have they got resources they'd recommend?' *After we'd finished all the big group sessions, they then sent out an email with all the resources.*" Interviewee 3, 25-34, MS management participant.

However, sometimes sharing became a difficult experience, because people shared distressing experiences with the group, and other interviewees indicated that others may feel too ashamed to share their thoughts.

> "*People shared quite, sort of, distressing elements of their journey* […] *every session*." Interviewee 1, 25-34, pain management participant.

> "*Sometimes you might have people actually share things which you were quite shocked about*." Interviewee 9, 35-44, NHS DPP facilitator.

Participants regularly compared themselves to their group members. Comparisons appeared to be helpful, and reassured participants about their own circumstances, and inspired progress.

> "*I think it's natural, when you're in a group, you start to compare. It's natural to compare one another*. […] *It does bring you back to Earth a little bit in that you, you know, that, yes, you're experiencing pain for a long time, but there's other people that are really struggling.*" Interviewee 1, 25-34, pain management participant.

> *"One of the members started doing a spinning class, and it sort of makes you think*, 'Alright. Okay, yeah, I might look into doing something like that.'" Interviewee 2, 45-54, HPC participant.

Comparison to others within the group helped some people feel less alone, helping them to realise that they were not the only person in their situation.

> "*I think there was a massive* 'Oh, you get it' *moment*." Interviewee 7, 45-54, HPC facilitator.

Participants gave support to other participants during group sessions. This was regarded as an important part of the interventions, and participants felt positively about the support that they received during the interventions.

> "*You feel quite supported as well. We all felt that way.*" Interviewee 2, 45-54, HPC participant.

"*The peer support and the friendships that are then developed are really key. It's a really key part of the group.*" Interviewee 7, 45-54, HPC facilitator.

Flow of conversation

Sometimes, interviewees would find it difficult to talk naturally online, and the conversations would not flow well. This was because interviewees couldn't naturally all contribute at the same time. Facilitators would take actions to ensure that all participants could contribute to the group conversation.

"*It was difficult. Cause you'd either have no one talking or everyone talking*." And "*It is difficult, because everyone wants to say something. And then, yeah, you can't hear everyone. So yeah, that's that is always one of the difficulties of online.*" Interviewee 10, 35-44, HPC facilitator.

"*I think because there's that teeny, weeny time lag on Zoom calls you can end up accidentally interrupting each other. But I think people got used to that fairly quickly.*" Interviewee 8, 35-44, pain management participant.

"*Some people would only want to verbally communicate during the session. Other people were more than happy to, kind of, pop little messages into the chat box to discuss different points. I would just encourage them to interact whichever way they felt comfortable with doing*." Interviewee 9, 35-44, NHS DPP facilitator.

Some comments were raised about the group conversation going off on a tangent, where interviewees noticed other participants leading the conversation off onto tangential topics.

"*It became quite tangential, I found that it wasn't linking to what we were discussing*." Interviewee 1, 25-34, pain management participant.

"*When it was that free conversation, it could trail off to topics that we didn't necessarily need to talk about.*" Interviewee 3, 25-34, MS management participant.

In the situations where participants led conversations onto tangential topics, facilitators tried to get the conversations back to the topic of discussion, using various techniques to re-focus their participants. This was noticed and appreciated by participants.

> "*If they went off on a tangent, we would have to kind of say*: 'Let's think back to the original question, what were we talking about?'" Interviewee 10, 35-44, HPC facilitator.

> "*I could recognize this strategy happening, kind of guiding everyone back.*" Interviewee 4, 35-44, HPC participant.

Generally, interviewees felt that they lacked informal interaction within their virtual groups, compared to if the group had been held in-person. Many interviewees said that they missed this opportunity for informal interactions with their fellow group members.

> "*Not having that time to talk just before the session starts, and just after... And so there is that social aspect of it that you miss.*" Interviewee 1, 25-34, pain management participant.

> "*That's probably one thing that is lost from a remote based session is that you wouldn't have that interaction before, after or during the break*." Interviewee 9, 35-44, NHS DPP facilitator.

Interviewees shared their thoughts on what could be done to increase their opportunity for informal interaction, such as breaks, and ice breaker activities.

> "*I don't see if there would have been a harm to have, maybe, even like a five-minute coffee break, where people have a time to just chat.*" Interviewee 1, 25-34, pain management participant.

> "*You can't recreate that… that they get from face to face, in the car park, the chance meets beforehand, and so on. But you can, you can try and give them an opportunity to have that.* […] *You have like 10–15-minute ice breaker, and all stuff like that, and that provokes a lot of different conversation.*" Interviewee 6, 35-44, HPC facilitator.

Interviewees discussed their perception of social cues during their sessions, acknowledging that this was sometimes difficult virtually. Facilitators also struggled to read social cues virtually, which impacted their ability to 'read the room' during their sessions.

> "*There's certain social cues that you can kind of see that aren't even kind of… verbal, that are nonverbal, that you can kind of throw questions around the room where it's really hard to do that in a virtual setting*." Interviewee 1, 25-34, pain management participant.
>
> "*It was really odd reading the room.*" Interviewee 6, 35-44, HPC facilitator.
>
> *"I think on a screen, it's much harder to read the group as a whole, whereas in a room you can kind of scan the group.*" Interviewee 7, 45-54, HPC facilitator.

Certain participants would dominate conversations during sessions, with all interviewees commenting on this in some way. It was acknowledged that telling these individuals to be quiet may have led to negative effects, so facilitators had various strategies to deal with this.

> "*There's some people who are a lot more willing to talk and share and obviously they were those sort of characters where they talked a lot*." Interviewee 10, 35-44, HPC facilitator.
>
> "*I just said,* "That information you've just given us as a group is fabulous, so good that you're sharing that with us". *And I just say, which is truthful as well*, "can you please send me that information in an email?" Interviewee 6, 35-44, HPC facilitator.

Interviewees offered various explanations as to why this dominance occurred, ranging from reasons why an individual may feel the need to share lots with the group, to other group-related factors, such as the absence of conversation from other participants.

> "*People were struggling, and they would have a little good old moan [laughs]*" Interviewee 3, 25-34, MS management participant.

> *“Sometimes it could be just other people… anti-participating, and so, they feel that* ‘Oh, we're here. We need to make use of this. I need to keep talking because no one else is going to talk.’” Interviewee 8, 35-44, pain management participant.

Group rules

Generally, groups had set rules and expectations regarding how participants should behave and interact with one another during sessions. Rules included conduct towards other participants, such as being respectful of other participants’ points of view, as well as respecting and maintaining the group’s privacy. Rules also included practical rules involving guidance on virtual group etiquette, such as camera usage.

> “*Different opinions are valid. We all have different words that we use for different conditions. And that's fine, you know. No judgment*.” Interviewee 6, 35-44, HPC facilitator.

> “*Because we were sometimes talking about really emotional kind of situations, and it was confidential, of course, so I wouldn’t want to be overheard by a random person on the bus or in the supermarket*.” Interviewee 4, 35-44, HPC participant.

As a result of these rules, interviewees felt like their groups were a safe space for them to discuss their experiences.

> “*They were very good at creating that safe space* […] *you could be vulnerable, and you could be honest.*” Interviewee 1, 25-34, pain management participant.

> “*The rules were intended to help create that safe space. I mean, just sort of being kind and respectful, and things like that.*” Interviewee 8, 35-44, pain management participant.

Facilitators also discussed their rules regarding safeguarding, which were laid out during their training.

"*We had to talk about it, if we had concerns about somebody, what we would do if we if they told us something that we felt was concerning.*" Interviewee 10, 35-44, HPC facilitator.

Key themes	Theme summary
Participant attendance and engagement	Session attendance was high overall. Where facilitators noted that participants had to drop out, they generally expressed wishes to take part in the future.
Barriers and facilitators to engaging with interventions	Barriers to engagement mainly related to technology use, and included not having the appropriate technology and being nervous about using the technology. Facilitators to engagement also arose from the use of technology, and included increased convenience and accessibility, and in some cases, reduced anxiety around social interaction.
Experiences of intervention features	Participants appreciated facilitators, handouts, and other participants. They felt positive about these intervention features, noting perceived positive effects of these features, such as increasing self-confidence. Facilitators appreciated the structure of programmes, and their training. Improvements could have been made in some cases to the consistency of facilitators, and increasing breaks in sessions.
Experiences of group interactions	The value of interacting with other group members was reported by all. This included rapport and bonding, sharing with the group, group support, and comparing to others in the group. Some elements of social interaction were perceived to be different to in-person groups, such as conversational flow, informal interaction, and the perception of non-verbal social cues. Group rules helped to place boundaries and expectations on social interactions.

Table 10: The four themes and a summary of key findings of each theme in this qualitative study

3.4: Discussion

This study builds on the review presented in Chapter 2 to provide insights into the experiences of facilitators and participants of virtual group interventions for

preventing and managing chronic physical conditions. See **Chapter 4: Overall discussion** for an overview of how these studies linked to one another. It was found that these virtual groups were well-attended and well-received by intervention participants interviewed, who appreciated the social connections that they formed, in spite of the virtual nature of the groups, and the lack of opportunities for informal interaction. Although interviewees had varying levels of confidence and experience with the required technology, technical problems were generally not disruptive, and levels of confidence grew as the sessions continued. Participants and facilitators acknowledged the importance of virtual delivery with regards to giving people access to the interventions where they otherwise may not have been available.

The following discussion will further explore this analysis in relation to relevant theory including the COM-B model for behaviour change, as well as current literature.(125) The discussion splits the themes into two broad sections: the first covers the practical aspects of running and attending the groups, which encompasses the first, second and third themes, focusing on attendance and engagement with the interventions. The second section covers the social aspects of the groups, which encompasses the fourth theme and some elements of the other themes. The decision was taken to discuss the themes in this way because of the size of the fourth theme relative to the others, to allow the social implications of a virtual group to be discussed in more detail. The implications of this study on future research and practice are then discussed, followed by the study's strengths and limitations.

3.4.1: Practical factors: Engaging with the interventions

A major finding of this study was that interviewees valued the ability to take part in the interventions virtually, as opposed to in-person. This was for many reasons, including the time, money and energy saved with a reduced need to travel. This led to high overall levels of reported engagement among the interviewees. Convenience was perceived by interviewees to be a positive consequence of the virtual delivery. With interviewees' busy schedules, many felt that they wouldn't

have been able to take part in their intervention if it had been in-person, as this would have removed the flexibility associated with online delivery.

This links to participants' *opportunity* to engage with sessions, and shows that making interventions virtual may lead to an increased opportunity to take part in interventions, which, as highlighted by the COM-B model, is a crucial precursor of behaviour change.(125) Sessions were well-attended by those interviewed, with all interviewees in this study attending at least 80% of their sessions. This has also been seen in previous virtual group interventions, with participants appreciating the lack of travel required to take part, as well as the ability to take part in the sessions from any location.(69,99) Indeed, the facilitators acknowledged that even those who were unable to take part in the interventions expressed a desire to take part in the interventions in the future.

Interviewees with anxiety also found it helpful to engage with the sessions online, feeling less intimidated and daunted when sharing their experiences. On a similar note, one facilitator in this study noted the potential of virtual groups to be less triggering for individuals than running group sessions from a location such as a school, or a hospital. In previous interventions, virtual delivery of groups has been used in the hope of reducing anxiety surrounding participating in the intervention.(57,161) In relation to the COM-B model, this reduction in potential anxiety could represent a way to increase participants' capability and motivation to engage with an intervention.(125) This is because if a participant has anxiety reduced, they may feel their own capacity to attend sessions increasing, which in turn may lead to increased motivation and desire to attend sessions. These findings are highly important in the context of these interventions, because whilst studies of the in-person versions of the NHS DPP and the HPC programme have taken place, there has been no such focus on the virtual versions as yet.(162,163)

Facilitators were a major factor influencing participants' experiences of their interventions in this study. They were generally regarded as being helpful and supportive to group members, and were viewed as a key part of intervention success. In previous literature, facilitators have been shown to be highly important, through developing a bond with participants, and making each participant feel included in the sessions.(164) Effective facilitation has been

linked to many interpersonal and intrapersonal change processes, including building self-efficacy.(78) As noted in the systematic review featured in Chapter 2, facilitator training has been historically poorly reported in the literature, with many studies featuring brief accounts of facilitator training, and some studies not reporting this at all.(57,78) However, all of the facilitators in this study described the thorough training that they took part in prior to their virtual group intervention, which may have contributed to their reports of receiving a positive reception in the interventions with which they were involved.

Participants in this study suggested several improvements that could be made in future iterations of their interventions. One improvement suggested by some interviewees was increasing consistency of the facilitator that was present in their sessions. These interviewees felt that if they had had a consistent facilitator throughout their programme, they may have built up a stronger relationship, built on trust and rapport, perhaps leading to increased sharing of stories and experiences. Indeed, in this study, strong participant-facilitator relationships were identified in those interventions where a facilitator remained consistent throughout the course of the intervention. This may link to an increased sense of group identity, and participants' readiness to receive advice and support from their facilitators.(29,165) In the context of the COM-B model, this may also link to participants' motivations to attend sessions, as well as to engage with the content during sessions – if participants have a better relationship with their facilitator, they may be more likely to want to continue attending.(125)

Another improvement that was suggested by interviewees in this study stemmed from the fact that some participants lacked the optimal technology to support them with fully participating in the intervention – participants suggested reducing the use of functions that were difficult to view on certain devices. For example, for those joining on smartphones, functionality of the videoconferencing software was compromised, representing a limitation to participants' opportunity to engage.(125) In the literature, this concern that some participants may not experience the intervention in an optimal way (or at all) because of a lack of appropriate technology is commonly discussed by intervention organisers, and some studies have tried to mitigate this potential inequality by loaning technology

to participants in order to take part in an intervention.(94) However, none of the participants interviewed in this study were loaned technology, which may have important implications. For example, it's possible that the loaning of larger tablets or laptops may have reduced mobile phone usage and improved these users' experiences of using the software, and opportunities to engage.

3.4.2: Social interactions

Rapport and bonding formed a key part of interviewees' experiences of the interventions. Generally, interviewees formed positive connections with other group members, although it was acknowledged that this may have taken longer than it would have done if the groups had met in-person. Building a rapport, and initiating bonding between participants, are integral parts of any group intervention.(78,137) Indeed, the findings of this study have shown that they may have effects on many other social interactions as part of a virtual group, such as conversational flow and topics discussed within the group. For example, participants may be less likely to share experiences and advice with others if a rapport hasn't been formed between them and the other participants.(137) In previous studies, an increased ability to share experiences has been linked to increased supportiveness and openness, and has resulted in increased self-efficacy and motivation for behaviour change.(166) Improved rapport and relationships with fellow participants may represent an important way to increase participants' motivation to attend sessions, in a similar way to how relationships with facilitators were discussed previously.

Rapport and bonding between participants may be facilitated through many different activities, for example, meeting outside of sessions, or maintaining a dialogue after the intervention has finished. This has been encouraged in past face-to-face group interventions, to help facilitate knowledge sharing and sustain behaviour changes at the end of the intervention.(167) Indeed, in a mixed-methods process evaluation of the HPC programme, it was found that participants in the in-person version of this programme valued bonding with others and receiving social support.(162) Online peer networks have also been

shown to influence individuals' decisions to maintain higher physical activity levels.(166)

A major drawback of virtual groups identified in this study was limited opportunity for informal interaction within the groups. Some interviewees identified this as an unavoidable negative consequence of the online nature of their groups, especially compared to in-person groups, where it was perceived as easier to meet in places like communal kitchens, or car parks. This has been seen previously in the literature on virtual groups in healthcare, where this lack of informal interaction has been perceived as a barrier to building a community online.(161) Subsequently, it has been suggested that building in opportunities specifically for icebreaker activities would be beneficial for building relationships.(168)

Some interviewees in this study experienced a strong sense of group identity, referring to their group as a 'tribe' by the end of the intervention. Increased group identity has previously been linked to an increased sense of belonging, common purpose, sense of commitment to others in the group, and a subsequent increased motivation to attend intervention sessions, which is an integral part of behaviour change.(125,166,169) Given the link between individuals' attendance and the attendance of their peers, increasing attendance by any means is a valuable addition to a group intervention.(170) Linked to this sense of group identity, peer support was an important feature of the interventions included in this study. Social support has been identified as a key behaviour change mechanism in group interventions.(78) Indeed, in previous studies of the NHS DPP, social support between peers has been highlighted as a crucial aspect of the intervention, facilitating sharing stories and advice.(163)

One thing that may have influenced social interactions, and the overall group dynamic, was the group composition. It has been noted previously that a shared group identity – which may have many positive health effects if it encourages individuals to follow group norms such as regularly exercising – may be influenced by the degree of similarity perceived between an individual and their peers.(111) In other words, if a group is composed of individuals with similar demographic characteristics, they are more likely to experience a shared group

identity.(111) In a previous study of the NHS DPP, facilitators expressed a need to adapt the sessions to be delivered to men-only groups.(163) However, in this study, it was found that individuals also valued having a diverse mix of voices within their groups. Indeed, in other studies, a more diverse mix of experiences was regarded as a benefit, because it enriched participants' experiences of sessions.(164) This indicates that further research is needed on this topic to explore where similarity and diversity may be important.

As well as sharing experiences and advice, interviewees in this study valued being able to compare themselves to others in the group. For some, this was a reassuring experience, reminding them that others in similar situations were able to cope, and some interviewees found comparing themselves to others to be a source of inspiration. This has been found in other studies, where social comparison has formed an important feature of interventions, motivating group members to make positive changes and maintain involvement in the intervention.(171) The COM-B model highlights that motivation is an integral part of an intervention's success.(125) In a study of a physical activity intervention for those with type 2 diabetes, participants were inspired to make their own changes after having seen other group members' successes with behaviour change.(166) This shows how social comparisons can link to role-modelling, which is also important to build participants' self-efficacy and motivation.(29)

Conversational flow was another topic that was regularly brought up by interviewees in this study, with many interviewees noting that conversations did not flow easily online compared to in-person. This perhaps contributed to participants beginning tangential conversations, or dominating conversations. In this study, nearly all interviewees commented on the presence of dominating individuals in their group sessions. This has also been identified in other studies of face-to-face group interventions, where some participants have been more confident and willing to share their stories, which results in these individuals dominating group conversations.(78) However, many interviewees in this study indicated that facilitators effectively led the conversations back towards relevant topics. This has been less well-reported in the literature, with reviews of virtual

and in-person group interventions finding a lack of reporting on facilitators' actions.(57,137)

Group rules were identified as an important feature of the interventions in this study. In a virtual group setting, rules around privacy, safeguarding, and conversational etiquette may need to be outlined to participants more explicitly than in-person, because of the slightly removed nature of interacting virtually. For example, some studies on virtual healthcare delivery have expressed concerns over facilitators missing important safeguarding cues virtually.(172) However, in this study, many interviewees commented that their group rules resulted in the creation of a "safe space" where they felt secure in sharing their – sometimes highly personal – health-related experiences, and all facilitators reported having adequate safeguarding training related to their virtual groups. This clear delineation of group expectations may increase individuals' capacity to engage with the interventions appropriately, a key component of behaviour change.(125) For example, if a participant is not aware of the expectations surrounding microphone use, they may not engage appropriately, such as leaving their microphone on. Having group rules in place was also a key recommendation of the systematic review presented in Chapter 2, and these findings further demonstrate the importance of having a clear set of expectations.

Different changes took place within interviewees after having taken part in the interventions, reliant on both the practical and social aspects of interventions working together. This included re-evaluating what's important to them, and increasing self-efficacy in relation to improving diet and physical activity levels. In other studies of virtual group interventions, similar changes have taken place, with participants' motivation and self-efficacy increasing after having taken part in a virtual group.(69,94) Many attributes of interventions helped participants to change their behaviour. One facilitator noted how she discussed the progress that participants were making on achieving their goals during sessions. Goal setting has been identified as a highly important behaviour change technique, which is extremely widely used by participants.(78) For example, in a weight loss intervention, goal setting and planning was amongst the most widely-used

behaviour change technique amongst participants with recently-diagnosed type 2 diabetes.(173)

3.4.3: Recommendations for future research and practice

See **Table 11** for a summary of the recommendations generated by this study. The findings from this study suggest that increasing opportunities for informal interactions among participants should be encouraged by group leaders. Intervention organisers and facilitators should factor in elements of informal socialising in their sessions where possible. This could include the use of icebreaker activities or breakout rooms. It could also include opening the video call before the session begins, and leaving the video call on after the session has concluded. This would act, in some ways, to replicate the discussions that participants may have when they are physically joining and leaving in-person group sessions. This may lead to an increase in the speed at which a rapport is established between the participants in the group, potentially increasing openness and trust within group sessions. It would be interesting to compare the differences in rapport-building in versions of a virtual group intervention where informal interactions are, and are not, built into the intervention design, for example through a randomised controlled trial.

Interviewees were clear that sessions should have group rules, which are outlined at the start of the intervention/sessions and understood by all participants. Whilst no specific rules can be recommended based on the findings of this study, many rules applying to virtual group interventions may also apply to in-person groups. Generally, rules should promote respect, tolerance and privacy, as well as virtual group etiquette such as camera usage. Rules should also be reinforced by facilitators, as they can promote a positive group dynamic conducive to positive relationship building and behaviour change within participants.(146)

Given the value facilitators placed on training in the interviews, in future interventions, the training of facilitators should be thorough and detailed, and specific to facilitating a positive virtual group. This training should also be thoroughly reported in future studies. Having a detailed picture of the training

received by successful facilitators would allow future intervention designers and facilitators to evaluate their own training practices, to ensure that all facilitators feel well-prepared to successfully deliver a virtual group intervention.

Based on findings here, where possible, intervention designers should try and ensure that there is some consistency in facilitators throughout the course of an intervention. Although there is also value in a multidisciplinary approach to facilitating a group intervention, for instance different professionals delivering sessions according to their expertise, consistency of facilitators should help to effectively build relationships between the facilitator and their participants, which may increase levels of trust, leading to more open and honest discussions during group sessions.

Future studies could also build on the findings of the present study, and the systematic review presented in Chapter 2, to explore the extent to which interpersonal change processes operate in virtual groups, to explore how they differ from in-person groups. This study has highlighted some evidence of similarities of mechanisms between virtual and in-person groups. For example, interviewees remarked on the importance of sharing with others and the importance of facilitators, which have also been identified as important interpersonal processes in in-person group interventions.(146) There was also some evidence that some interpersonal processes may take longer to facilitate virtually than in-person, such as rapport and bonding, although this is difficult to ascertain with this small sample. Future studies of these interpersonal change processes should explore the differences to established in-person processes and how these may best be facilitated in virtual groups.

Studies involving populations who lack access to the technology required to take part would be an excellent avenue for future research, extending the results of the present study to additionally explore the experiences of those who could not participate in these interventions. Linking back to the COM-B model of behaviour change, exploring measures to increase potential participants' capability and opportunity to take part in interventions may help to increase equity within these programmes.

Recommendation	Further details
Increasing opportunities for informal interaction	Informal interaction was missed by participants in this study, and it was suggested that this may help with rapport and bonding.
Group rules should be clear and should promote respect and privacy, as well as virtual etiquette	Interviewees appreciated having clear expectations surrounding social interactions and virtual etiquette in this study. They also appreciated how rules made their sessions into 'safe spaces' in which to open up to others.
Training of facilitators should be detailed and reported in detail	Facilitators in this study reported valuing their training because of the effect that it had on their confidence to deliver an intervention successfully.
Exploring interpersonal change processes	This study identified some interpersonal behaviour change processes, such as social support, but further, more detailed exploration, is warranted.
Exploring experiences of those without technology	Hearing from those without the capacity or opportunity to use the technology required for these interventions is highly important to ascertain how they may be improved.

Table 11: Recommendations generated from this qualitative interview study

3.4.4: Strengths and Limitations

This study used open-ended questioning during semi-structured interviews with a unique sample of participants and facilitators to explore a range of experiences of a relatively novel method of intervention delivery. The interviewees had no prior connection to the interviewer, CR, and the interviewees were made aware that CR also had no connection to their intervention. Subsequently, interviewees were able to be open and honest about the drawbacks of their interventions, as well as the benefits.

The five virtual group interventions with which interviewees had been involved differed to one another in relation to their focus, purpose, and target populations.

In some ways, this is a strength of this study. It allowed this study to explore experiences across a range of different interventions, and demonstrated that, despite their differences, many common themes were present. This suggests that there are some experiences which may arise regardless of the focus of the intervention, which may be useful to designers and organisers of future virtual groups, including a lack of informal interaction, participants dominating conversations, and the benefits of sharing experience and advice with other group members.

However, the varied nature of included interventions meant that interventions were perceived very differently to one another by their participants and facilitators. For example, because the focus of HPC was on self-care and sharing experiences with other parents of children with life-altering conditions, this intervention fostered strong social connections between participants. The NHS DPP, however, is more focused on education and support around practical methods through which individuals can lower their risk of developing type 2 diabetes, which means that the intervention is less about social support and bonding than HPC. When comparing the interventions in this study, it is important to remember that some interventions were not designed to foster these friendships and connections, but to impart information for individual use.

All of the interviewees in this study were female. This was not by design, as men were eligible to participate. However, two of the main sources of recruitment for this study – the remotely-delivered NHS DPP and the HPC programme – were exclusively, or mainly, attended by women. In the case of the NHS DPP, this is because this strand of this intervention was focused on managing gestational diabetes, and in the case of HPC, this may be because mothers formed the majority of their participants. Indeed, in a mixed-methods process evaluation of the HPC programme, 97% of participants were female.(162) This may have had an impact on the applicability of the findings of this study to men, as the experiences of men and women taking part in virtual group interventions may differ substantially. Exploring the experiences of male participants (and non-participants) in virtual group interventions is therefore an important next step in the research.

In this study, all of the participants had attended a high proportion of their sessions, despite efforts to advertise the study to people that had not taken part in many sessions or dropped out of interventions. Despite this being likely in all studies of interventions, this will have led to a biased sample in the present study. Those who missed sessions or dropped out are likely to have had markedly different experiences of interventions compared to those interviewed in this study. Exploring their experiences of interventions, and reasons for not attending, would provide a rich source of information relevant to intervention designers and organisers.

Similarly, in this study, all of the interviewees were comfortable with using videoconferencing software, and had the capability, opportunity, and motivation to do so. This means that they had access to appropriate technology, knew how to use it, and wished to do so. Whilst it would have been comparably more difficult to interview those without the capacity, opportunity, or motivation to use the required technology for these interventions, another limitation of this study is that these voices are missing from this discourse.

Another potential limitation of this study is the use of rapid framework analysis, rather than the originally intended in-depth, reflexive thematic analysis. The need to be transparent about making pragmatic choices in research has been previously highlighted.(174,175) In the case of this study, the need to conduct the analysis as rapidly as possible arose from the length of time that it took for this study to gain ethical approval (for further details, see **Appendix 13: Ethics timeline**). This was unprecedented, and although the framework analysis provided a suitable alternative to in-depth thematic analysis considering the time constraints, it should be acknowledged that conducting the full reflexive thematic analysis as intended may have gleaned a richer understanding of the findings.

3.5: Conclusions

This study exploring the experiences of participants and facilitators of virtual group health interventions found that they were generally positive. Findings from this small sample of interviewees indicated that there were high levels of

attendance and engagement in these interventions, and they allowed positive social interactions between group members. Generally, groups were highly accessible, with a limited number of barriers (e.g., technical problems) to engagement identified. Facilitators were an important feature of the interventions, and facilitators felt their training was adequate for them to feel prepared for and confident in session delivery. Relatedly, participants appreciated clear rules and expectations surrounding conduct during sessions.

Participants and facilitators reported perceived benefits to a virtual group compared to an in-person group intervention, particularly because of the lack of a need to travel to sessions. These included convenience, reduced stress, and reduced expense. Participants benefited from positive social interactions during their sessions, including sharing experiences and advice, with many feeling a genuine rapport with their fellow group members. Participants and facilitators acknowledged that the virtual delivery of these groups placed some limitations on social interactions within the groups, through issues such as certain participants dominating conversations, and a limited flow of conversation which may have been exacerbated by the virtual format. All participants and facilitators suggested informal interaction would increase the chances of experiencing meaningful social interactions and building rapport.

In future interventions, a focus should be placed on initiating and facilitating informal interaction amongst participants, similar to the informal social interactions that would take place during an in-person group intervention, for example through using ‘icebreaker’ or break out activities. Future studies should also focus on the experiences of non-participants, including those who lacked the opportunity to participate in these interventions through, for example, a lack of appropriate technology. This study has highlighted the positive experiences of those taking part in, and leading, virtual group interventions, and it is crucial that future studies in this area focus on increasing accessibility and equity for all potential participants.

Chapter 4: Overall discussion

4.1: Statement of principal findings

This project explored what it is like to take part in, and facilitate, virtual group interventions for preventing and managing common chronic physical conditions. This is a novel area of research, perhaps hastened by the Covid-19 pandemic. A systematic review of the literature and a qualitative interview study of participants and facilitators were conducted in order to build a deeper understanding of a wide range of experiences. Overall, the findings from these studies were largely congruent, with findings from the interview study both complementing and building upon the findings from the review. Both explored experiences of a range of different interventions, and found several themes in the experiences that were shared by those involved in these interventions.

A common thread across the studies was that virtual groups entail increased convenience. In the systematic review and participant interviews, it was reported that virtual groups are easier to access and attend than in-person groups, for many reasons. For example, some interviewees commented that a lack of travel required to attend these groups was a major advantage of these interventions, bringing increased accessibility for those who were physically unable to travel, such as those living with chronic pain, and those with caring or work responsibilities, whose schedules would not permit them to take part in an in-person group. In many cases across the systematic review and interviews, intervention participants commented that they would not have been able to take part in their intervention if it had taken place in-person.

Overall, it was found that social interaction in virtual groups was perceived to be different to in-person interactions. Participants in both studies reported that the flow of conversation in their virtual groups was different to what it may have been in-person, and there was consistently a reduced capacity to get to know their fellow participants. This was also reported by facilitators in the interviews, who acknowledged that opportunities for informal social interaction, such as in the car park before and after sessions, were minimal in virtual groups. Sometimes, measures were put in place to facilitate increased social interaction, such as

breakout rooms and icebreaker activities, which were well-received by participants in the qualitative interview study.

Despite this, a clear thread throughout this project was the value that participants placed on the social support, accountability, and ability to share experiences and advice with their fellow group participants. This social interaction, despite differences with interactions that take place in-person, formed a critically important part of many interventions.

Technical problems were present in many interventions, and included audio issues and connectivity problems. These were particularly reported in the older studies included in the systematic review, but less so in the interviews. In both studies it was observed that some participants lacked confidence in using their devices, and the technical element of the intervention was a source of anxiety for them. However, when technical problems did arise, they were generally met with good humour by group members and facilitators, and did not present a major barrier to engagement. Similarly, this lack of confidence with technology generally dissipated over the course of the interventions, as participants' capabilities to use the technology grew.

Group rules formed an important part of interventions in both studies. Particularly in the interviews, participants commented on how important it was for group rules to clearly state expectations surrounding social conduct and technology etiquette. Participants valued the way that group rules created a safe space during sessions, and the way that this allowed them to express themselves more freely.

Finally, facilitators were consistently identified as important by participants in the projects in this thesis. In both studies, participants acknowledged that a good relationship with their facilitators was critical to their engagement with the intervention. In the interviews, participants commented that having a consistent facilitator meant that they felt more relaxed and comfortable during sessions, and facilitators remarked on the importance of their training to allow them to deliver interventions successfully. However, in the systematic review, such training was not identified in reports.

4.2: Comparison to the literature

To the author's knowledge, no studies in this area have linked a systematic review and a qualitative study together. However, there are several studies, including qualitative studies and systematic reviews, that have focused on similar areas. For example, many studies have concurred that the convenience of both individual and group-based virtual interventions is one of the biggest advantages of this mode of delivery.(54,161,176) Indeed, a systematic review of individual and group-based virtual interventions for type 2 diabetes prevention described the remote delivery of these interventions as having the ability to 'revolutionise' diabetes care, because of the convenience that they offer to participants.(120)

Social interaction has been found to be a highly important part of group interventions. In work by Borek *et al.* on behaviour change mechanisms present in group interventions, many important mechanisms represented interpersonal processes taking place as a result of interactions *between* group members.(22,29,78,143) This is fundamental to how these interventions change participants' behaviour, and hence it is perhaps unsurprising that social interaction was identified as a critically important part of these interventions by many participants and facilitators.

The difference between in-person and virtual social interactions has explored in many studies on virtual interventions in healthcare – for example, a study into virtual interventions, or 'telehealth', in oncology found that some providers struggle to build up a rapport with their participants during virtual sessions, compared to in-person sessions.(54) Many have raised concerns about the lack of meaningful social connection in a virtual setting, which is valid, especially considering how important social interaction is for behaviour change to occur in groups.(69) However, studies have also identified ways that social interactions can be facilitated between participants in a virtual group – for instance, one study in a virtual group setting employed strategies such as 'getting-to-know-you' games, icebreakers, and discussion starters, in order to build positive relationships and increase participation in the intervention.(145) Despite this

study's small population (29 participants), hence potentially limited generalisability, the importance of such strategies was also highlighted by the participants of the qualitative interview study of this thesis, which suggests they should be considered by facilitators and organisers of future interventions.

4.3: Strengths and limitations of the project

Through this combination of complementary studies, and guided by public involvement, this project has taken the first steps towards developing a deep understanding of what it is like to participate in, and facilitate, these interventions. This understanding has led to the development of a series of recommendations that can be applied by those designing and delivering these interventions in the future, to help optimise them.

Both studies in this project explored interventions for a range of common chronic health conditions. This is a strength of this project, as the findings have shown that many experiences of participants and facilitators are common to interventions across conditions. These common themes throughout this project illustrate that, despite differing participants and conditions, in many cases, what leads to interventions being well-received remains the same. Therefore, the recommendations from these projects can likely be applied to interventions for many conditions.

This project incorporated PPI in both studies in order to ensure that the research was both relevant and important to stakeholders. This was a strength because it meant that the findings of the studies were applicable to the 'real-life' questions and concerns identified by those who have chronic conditions themselves. However, one limitation of this project is that PPI consultations could have been extended to speak to facilitators as further stakeholders in the second study, so that their experiences were echoed in the topic guides and analysis of findings. By not including facilitators, such as clinicians, in this conversation, important views and comments may have been omitted.

Similarly, to make the studies of this project align even further, the experiences of facilitators could have been explored in the systematic review, as well as during

the qualitative study. This approach was not deemed to be feasible at the time of conducting this first study, due to time constraints, as well as a lack of literature focusing on facilitators identified in scoping searches. However, this would have allowed a more guided approach to interviewing the facilitators in the qualitative study, by building upon findings about the experiences of facilitators observed in the systematic review.

Another limitation that arose due to the limited time frame of this project was that only interventions for common chronic physical conditions were explored. The studies in this project did not explore any interventions relating to cancer care, infectious diseases, cognitive conditions, or mental health conditions. There have been many studies exploring virtual group interventions for such conditions, including HIV management interventions, and groups for mental and cognitive health.(75,77,149,161) Despite the fact that many of the findings across the studies in this project aligned regardless of the condition that the intervention focused on, it should be acknowledged that the recommendations generated by this study may not be applicable to interventions focused on other conditions, for example groups for managing mental health conditions.

The experiences of those who *didn't* take part in a virtual group intervention were not explored at all by this project. This is not only a major limitation of this project, but is also a limitation of other studies in this area. It was not deemed feasible to explore experiences of non-participants, as it was difficult to identify any studies that had input from non-participants in the systematic review, and it was challenging to recruit participants who had dropped out of interventions for an interview, despite targeting them in recruitment. This is a major limitation in this area because the views of people who either choose not to participate in these interventions, or do not have the capability or opportunity to take part, are perhaps the most important to inform how interventions can be made more accessible and acceptable. Without capturing their experiences and opinions, it remains challenging to generate recommendations for how to increase uptake of virtual group interventions amongst this group, or indeed, how to help individuals to find the interventions to which they may be most suited.

Similarly, the experiences of designers of interventions were not explored in this project. Particularly in the interview study, it would have been interesting to ask them about the reasoning behind any decisions made regarding the different features of their interventions, and to observe the extent to which this aligned with the experiences of those facilitating and participating in these interventions.

Due to the studies reported here focussing on exploring the experiences of participants and facilitators of virtual group interventions, clinical outcomes of participants weren't explored. On one hand, this may be seen as a strength of this project, because the time and resources were dedicated to developing an understanding of the many rich experiences that participants and facilitators offered, for a range of conditions in what is a relatively new area of research and healthcare. On the other hand, this could be viewed as a limitation, because without having evidence on the effectiveness and clinical implications of virtual group interventions, it is hard to ascertain whether they can be deemed successful and which factors may contribute to their success.

4.4: Implications for clinicians, policymakers and researchers

For a visual summary of the overall recommendations for clinicians, policymakers and researchers from this project, see Error! Reference source not found.. The findings demonstrate that virtual group interventions offer a convenient and well-received alternative to in-person group interventions. Participants find virtual groups convenient, especially when they have physical needs or other commitments that may make it difficult for them to attend an in-person group. Clinicians, intervention designers, and policymakers should therefore carefully consider which participants may benefit from delivery of virtual group interventions and offer options if available. For example, if a chronic pain management intervention is currently being held in-person, decision makers should assess the possible benefits to participants that may be experienced by a transition to virtual delivery.

Decision makers and designers should recognise social interaction as a priority when planning and implementing virtual group interventions. Time for participants

to get to know one another should be factored in and supported by facilitators, and some evidence here suggests that consistent leadership is important to build a positive and supportive group dynamic. Opportunities for informal interaction appear critical, and should be built into these interventions, through breakout rooms or icebreaker activities. Where appropriate and feasible, online groups in which participants can directly interact with one another (rather than just the facilitator) and thus interact socially on their own terms, may provide an effective way for them to share advice and resources with one another. Participants may also choose, and might be encouraged to, organise ways to check in on one another after the completion of the formal intervention to sustain changes made and potentially support further change.

Similarly, group rules should be made clear to participants at the start of the sessions, and all participants should be aware of what is expected of them, both in terms of social interaction and virtual group technology etiquette. Participants in the projects in this thesis, particularly in the qualitative study, valued having group rules to create a safe space. Intervention designers could consider creating these rules in collaboration with stakeholders, such as patient and public involvement groups, to ensure the rules are appropriate and necessary.

Thorough facilitator training is another recommendation of this thesis. Facilitators in the qualitative study valued how their training prepared them to be successful group leaders. Training should be specific to managing a group virtually, and should include how to manage the dynamics of a virtual group, as well as covering key issues such as safeguarding, which may differ virtually compared to in-person interventions. Where possible, training of facilitators should also be reported in detail, so that future study teams can make links between successful intervention delivery and features of facilitator training.

Finally, researchers, policymakers and clinicians should also have equity in mind when planning and designing virtual group interventions. Indeed, decision makers should consider what can be done to ensure that all those needing support receive the intervention that best meets their needs. They should consult with potential participants, including those who have expressed reluctance or

uncertainty regarding taking part in these interventions, to discuss their opportunity, capability, and motivation to take part in virtual groups. Discussions may need to be had about what element of virtual interventions leads them to believe they are unsuitable for their needs. These needs could then either be addressed by adapting the delivery of virtual group interventions, or by offering an appropriate alternative intervention, such as an individual or in-person intervention, perhaps as precursor to later engagement with a group.

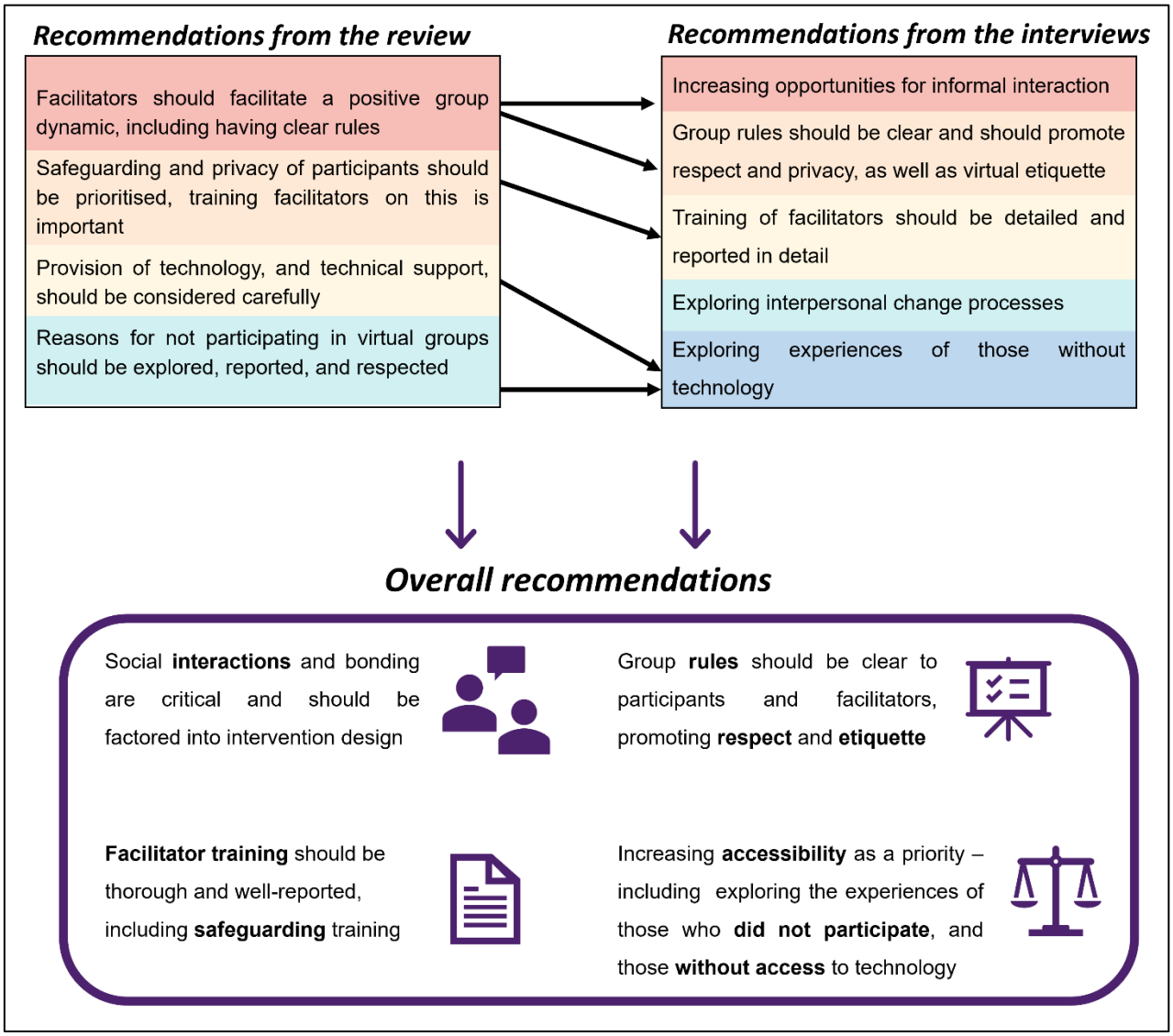


Figure 5: Summary of overall recommendations for practice from this thesis

4.5: Unanswered questions and future research

Through two aligning projects, this thesis has generated many unanswered questions surrounding virtual group interventions. For a visual overview of how these studies linked together to produce these unanswered questions, see **Figure** at the end of this section.

In the future, researchers should seek to understand experiences of those who were *not* involved in virtual group interventions. This includes those who could have taken part in a virtual group, but chose not to. Researchers should seek to ask what it was about these interventions that caused these individuals to choose not to participate. Similarly, researchers should also seek to understand the experiences of those who wished to take part in a virtual group, but could not participate. Generating a clear understanding of these experiences of non-participants, and how interventions could change to best meet their needs, should be considered a priority for those researching virtual group interventions.

Researchers should also explore the views and experiences of those involved in making decisions about specific elements of interventions, i.e., the intervention designers. This could be through focus groups or interviews, and would provide a future avenue to build upon the interview study conducted as part of this project. By understanding the thought processes behind these decisions, researchers can develop a more holistic understanding about how the intentions behind these decisions align with how they are received by participants. By increasing alignment between designers, facilitators and participants, researchers can gain a clearer understanding of how best to design and deliver interventions with the experiences of participants in mind.

Another avenue for future research in this area is to conduct studies evaluating and exploring outcomes for participants in virtual group interventions. This may be in the first instance through full-scale studies, perhaps of programmes already being delivered in practice in alternative formats, and later via systematic reviews and meta-analyses of such studies, which would provide insights into the clinical implications of taking part in a virtual group intervention. By further understanding the effectiveness and ideally, cost-effectiveness, of these interventions,

researchers may be able to ascertain how features of virtual group interventions make them more or less successful in changing behaviour of participants.

Similarly, future research could assess the presence of established interpersonal behaviour change processes in virtual group interventions. The projects within this thesis have reported that some of these processes are present, such as social support, but a further assessment of the extent to which processes are present in virtual groups is warranted. Establishing which processes may be present in virtual groups is important to ensure that interventions are delivered in a way that optimises their capacity for behaviour change within participants. Such research could be conducted in a similar way to the MAGI study by Borek *et al*., using their existing framework of behaviour change mechanisms identified in in-person groups.(146)

Finally, researchers should explore the experiences of those involved in interventions for a wider range of health conditions, such as cancer, infectious diseases, and mental and cognitive health conditions. By doing this, it will be possible to determine whether the findings and recommendations generated by this thesis are applicable to other conditions, and how and why these may differ across health domains. As virtual group interventions are being utilised in these areas, it is equally important to include the voices of those involved in these interventions in the research, to optimise their delivery.

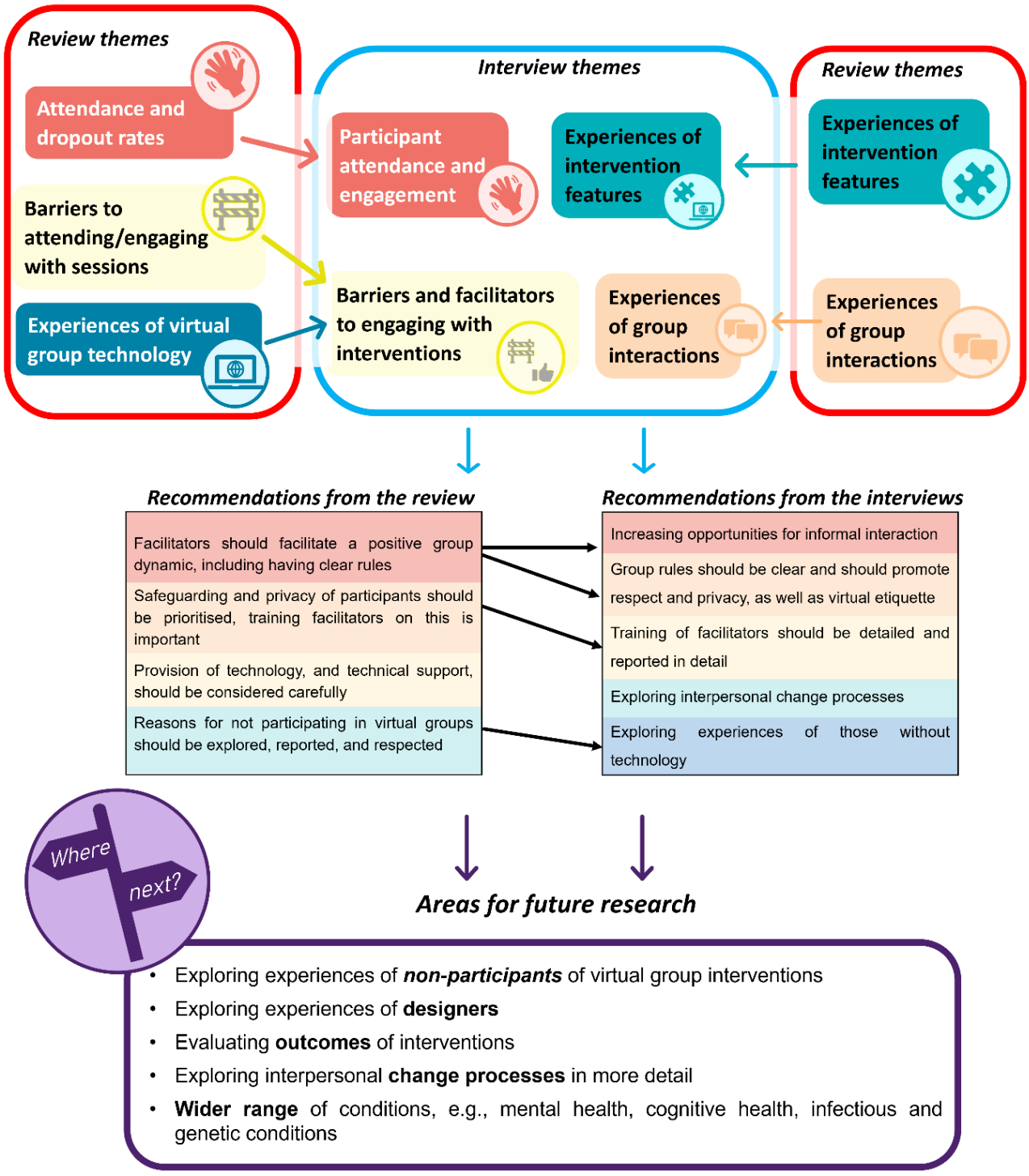


Figure 6: Overview of how the two studies in this thesis have linked to produce overall recommendations for future research

4.6: Concluding remarks

For the first time, this project has brought together findings from a systematic review and a qualitative interview study to explore the experiences of those facilitating, and participating in, virtual group interventions for preventing and managing chronic physical conditions.

This project has identified that, in many cases, the experiences of participants and facilitators are common across a range of interventions, for many different conditions. This includes the findings that virtual group interventions provide increased convenience; that social interactions in virtual groups are highly valuable to participants but somewhat different to those in in-person groups, and that whilst technological problems weren't uncommon, these generally did not impact participants' experiences of these interventions, at least since the pandemic.

Recommendations for researchers and practitioners designing and delivering these interventions in the future include an increased focus on facilitating opportunities for informal interaction, to increase rapport and bonding; and keeping equity in mind when planning target populations for these interventions. Future research should build upon the findings of the studies in this project by exploring a wider range of conditions, such as cancer, mental health, cognitive conditions, and infectious conditions. They should also aim to capture a wider and more diverse range of voices in this discourse, by exploring the experiences of men, those who did not take part in these interventions, as well as intervention designers. Overall, this project has demonstrated that virtual group interventions are well-received by participants and facilitators, and represent a convenient alternative to in-person groups with potential for wider use in an under-resourced health service that is struggling to meet increased demands. It is therefore hoped that the increased understanding that this project has generated may be used to guide optimisation of these interventions for delivery to a wide range of participants in future.

Acknowledgements

The biggest of thanks go to my fantastic supervisory team, particularly Dr Jane Smith and Dr Aleksandra (Ola) Borek. Jane has been the most brilliant supervisor, even when I decided that I needed to change course. Jane's support and reassurance has been invaluable – I know I couldn't have done this without her. I will really miss working with Jane in my new career. Ola's fantastic advice and words of wisdom have also been invaluable, and Ola herself has been a great source of support for me over the last few months.

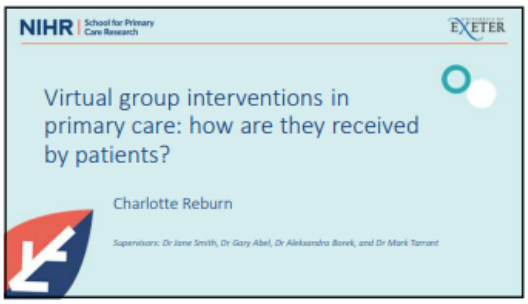
Special thanks also to Dr Emma Cockcroft, Dr Sinéad McDonagh and (soon-to-be Dr) Laura Hollands for helping me with my systematic review, and for trusting me to get involved with their own reviews.

My thanks also go to my brilliant office buddies in Smeall – Stella, Emma, and Emily, who have also been an enormous support in the last couple of years – I'll really miss working with them, alongside the general APEx team who have been a truly fantastic team to be a part of. I've made some great friends and have been really fortunate to work alongside lots of brilliant researchers on some fantastic projects.

Ober da!

Appendices

Appendix 1: School for Primary Care Research Elevator Pitch Presentation



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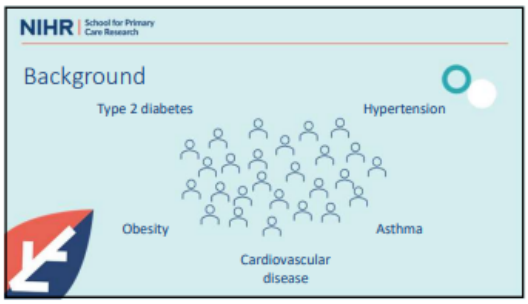

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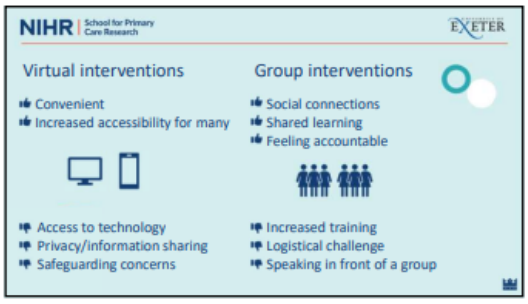

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Appendix 2: Poster presented at the Annual Research Event and the Doctoral College's poster competition – June 2022

NIHR | School for Primary Care Research

UNIVERSITY OF EXETER

Virtual group interventions in primary care: how are they received by patients?

Charlotte Reburn, NIHR SPCR-funded PhD student, clr226@exeter.ac.uk

The problem

The prevalence of chronic physical conditions such as **type 2 diabetes** and **hypertension** is increasing[1].

Many chronic conditions can be **prevented** and **managed** using behavioural interventions and education to make lifestyle changes, such adapting a healthier diet[2].

Increasingly stretched primary care services may benefit from interventions that save **time**, **money** and **resources**[3].

Virtual groups: a solution?

Virtual interventions
A patient and a healthcare provider meet through methods like video chat to discuss health[4]

- Convenient – no travel required
- Increased accessibility for many, including those with work or caring responsibilities

- Lack of access to technology
- Privacy concerns
- Safeguarding concerns

Group interventions
People with a similar condition meet with a healthcare provider to discuss their condition[5]

- Social connections with others
- Shared learning
- Feeling accountable to other group members

- Increased training for staff
- Logistical challenge to organise
- Some may not enjoy speaking in front of a group

? *Will new benefits and drawbacks emerge from combining these methods to deliver **virtual (video) group interventions**?*

Aim: conduct a **mixed-methods systematic review** on how **virtual group interventions** in primary care for chronic conditions are **engaged** with and **experienced** by patients

Methods

Develop **protocol** with research team and PPI group members, register on PROSPERO ✓

↓

Search **databases**: CINAHL, PsycINFO, Embase, and MEDLINE – 6661 results ✓

↓

Title and abstract **screening** – double screening with members of team …

↓

Data **extraction** – qualitative and quantitative findings on engagement and experiences ☐

↓

Data analysis: *Convergent integrated approach* - quantitative data is **transformed** into qualitative themes, then qualitative themes are analysed by **thematic synthesis**(6) ☐

Next steps

PPI revisited – to ensure that groups feel the findings of the review reflect what they felt was important to be researched

Dissemination – through publication, conferences, social media, getting the review's message to a wider audience

Primary qualitative work – interviewing those who have/have not participated in virtual group interventions

References: **(1)** OECD/European Observatory on Health Systems and Policies 2019. **(2)** Papadakis A, *et al.*, Ann Fam Med. 2021;19(3):258 –61. **(3)** Closing the gap [Internet]. The King's Fund. 2019 [cited 2022 Feb 22]. Available from: https://www.kingsfund.org.uk/publications/closing -gap-health-care-workforce **(4)** Murphy M, *et al.*, Br J Gen Pract. 2021 Mar 1;71(704):e166 –77. **(5)** Borek AJ *et al.*, BMC Public Health. 2015 Sep 25;15(1):963. **(6)** Stern C *et al.*, JBI Evid Synth. 2020 Oct;18(10):2108 –18.

This project is funded by the National Institute for Health and Care Research (NIHR) School for Primary Care Research (project reference 176).
The views expressed are those of the author and not necessarily those of the NIHR or the Department of Health and Social Care.

Appendix 3: Project summary poster at the SPCR Launch Event – June 2022

Virtual group-based interventions for the prevention and management of chronic physical conditions: a mixed-methods systematic review

Charlotte Reburn, Jane R Smith, Gary Abel, Mark Tarrant, Aleksandra Borek

Project summary

Chronic physical conditions, such as type 2 diabetes mellitus, are highly prevalent in the UK. It has been shown that group-based interventions can be effective at preventing and managing these conditions. Meanwhile, increasingly stretched primary care services may benefit from interventions that save time, money and resources, such as virtual interventions. This review aims to explore how the combination of these - virtual group interventions - are received by patients in primary care aiming to prevent or manage a chronic physical condition.

Aims/objectives

Systematically review the literature to explore how virtual group interventions, specifically group videoconferences, are:

- Engaged with by participants
- Experienced by participants

Methods

Mixed-methods systematic review of qualitative and quantitative studies focusing on patients' engagement with and experiences of virtual group interventions. Engagement may include findings on attendance and attrition, and experiences may include any opinions or attitudes of participants.

Quantitative data will be transformed into qualitative themes, and analysed with qualitative findings in thematic synthesis.

Progress to date

- PPI engagement
- PROSPERO protocol registered
- Title and abstract screening underway

Anticipated impacts

Findings of this review are expected to inform the latter stages of this PhD project. This will include developing a topic guide for interviewing those involved in virtual group interventions.

Funding – this review is being conducted as part of a PhD project funded by the NIHR SPCR (reference 176)

NIHR | School for Primary Care Research

This poster presents independent research funded by the National Institute of Health Research School for Primary Care Research. The views expressed are those of the authors and not necessarily those of the NIHR or the Department of Health and Social Care

Appendix 4: The Doctoral College's 'Tweet your Thesis' competition, which won Third prize – June 2022

Appendix 5: Poster presented at the Society for Academic Primary Care South West conference, March 2023

NIHR | School for Primary Care Research

University of Exeter

Engaging with virtual group interventions for preventing and managing common chronic conditions: a systematic review

C Reburn[1], STJ McDonagh[1], E Cockcroft[1], L Hollands[1], JR Smith[1]

[1]University of Exeter Medical School, Exeter, UK

Contact: c.reburn@exeter.ac.uk

Background

Many common chronic conditions can be **prevented** and **managed** using behavioural interventions and education that support lifestyle changes, such as adopting a healthier diet[1].

Virtual group formats have been used to deliver these interventions in conditions such as type 2 diabetes mellitus[2-4]. These interventions involve regular group meetings over **videoconferencing** software, led by a trained facilitator, often within **primary care** and community settings. They aim to initiate behaviour change by providing **education** and **support.**

The **aim** of this review was to explore participant **engagement with** and **experiences of** these interventions.

This poster focuses on **engagement**.

Methods

Search **databases**: CINAHL, PsycINFO, Embase, and MEDLINE

Article **screening** – title and abstract and full text, including **virtual group interventions** only (video-based interventions)

Data **extraction** – study and participant characteristics, methods, key findings on engagement with interventions, risk of bias assessments

Convergent integrated synthesis: quantitative data is **transformed** into qualitative themes, then themes are synthesised[5].

Inclusion criteria

Any type of study focusing on a **virtual group intervention** for managing **common** chronic physical **conditions** in **adults**

6559 studies screened (title and abstract)

207 studies screened (full text)

19 studies included

17 interventions included

Results at a glance

Participant engagement: key findings

There were differences in engagement between intervention groups and other groups, such as in-person groups, with **intervention groups having higher engagement** rates in many cases

75% Most virtual group interventions had an average attendance of **over 75%;** some were as low as **18%**

Reasons for not participating included scheduling conflicts, medical reasons, and lack of internet access

Barriers to engaging during sessions included technical problems and language barriers

Post-enrolment **non-completion rates** were low in most studies (under 25%), with one study having a 0% dropout rate

Participant engagement by key characteristics:

Participant engagement was found to be associated with participant characteristics in many studies. There was **limited consistency** between studies, with many studies contradicting one another for example:

Older age was linked to increased engagement in two studies, to decreased engagement in two studies, and was not linked to engagement in four studies.

Health status: One study found that higher baseline BMI was linked to poorer engagement with the intervention. Another study found no such association.

Risk of Bias: 50% of studies were rated as low/no concerns, 43% some concerns, 7% high concerns

Summary and next steps

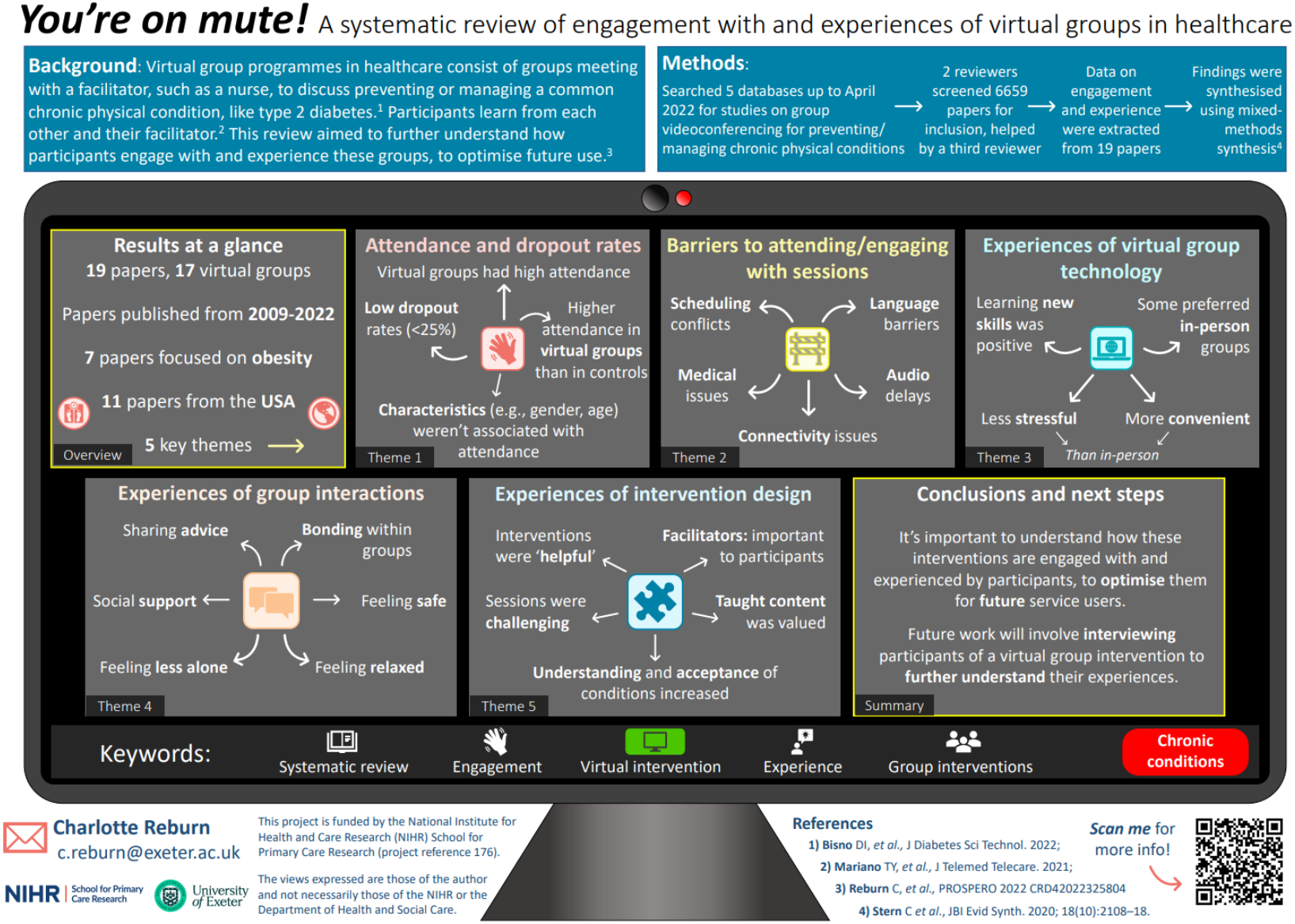
The results from this review demonstrate the varied ways in which participants engage with virtual group interventions. This review explored interventions targeting many conditions, which may help to explain the diversity of results between studies. The remainder of this review examines participant experience of these interventions, to help understand these findings more deeply. This will also be explored in participant interviews, the next stage of this project.

References: **(1)** Papadakis A, *et al.*, Ann Fam Med. 2021;19(3):258–61. **(2)** Das SK, *et al.*, Am J Clin Nutr. 2021; 114(4):1546–59. **(3)** Bisno DI, *et al.*, J Diabetes Sci Technol. 2022; 16(6):1419–27. **(4)** Mariano TY, *et al.*, J Telemed Telecare. 2021; 27(4):209–16. **(5)** Stern C *et al.*, JBI Evid Synth. 2020; 18(10):2108–18.

This project is funded by the National Institute for Health and Care Research (NIHR) School for Primary Care Research (project reference 176).
The views expressed are those of the author and not necessarily those of the NIHR or the Department of Health and Social Care.

Appendix 6: Poster presented at the UK Society for Behavioural Medicine conference, and the Faculty of Health and Life Sciences ECR Conference, March 2023

Appendix 7: Poster entered into the Doctoral College's poster competition, June 2023, and the School for Primary Care Research's Showcase Event, September 2023



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This project is funded by the National Institute for Health and Care Research (NIHR) School for Primary Care Research (project reference 176).

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References
1) Bisno DI, *et al.*, J Diabetes Sci Technol. 2022;
2) Mariano TY, *et al.*, J Telemed Telecare. 2021;
3) Reburn C, *et al.*, PROSPERO 2022 CRD42022325804
4) Stern C *et al.*, JBI Evid Synth. 2020; 18(10):2108–18.

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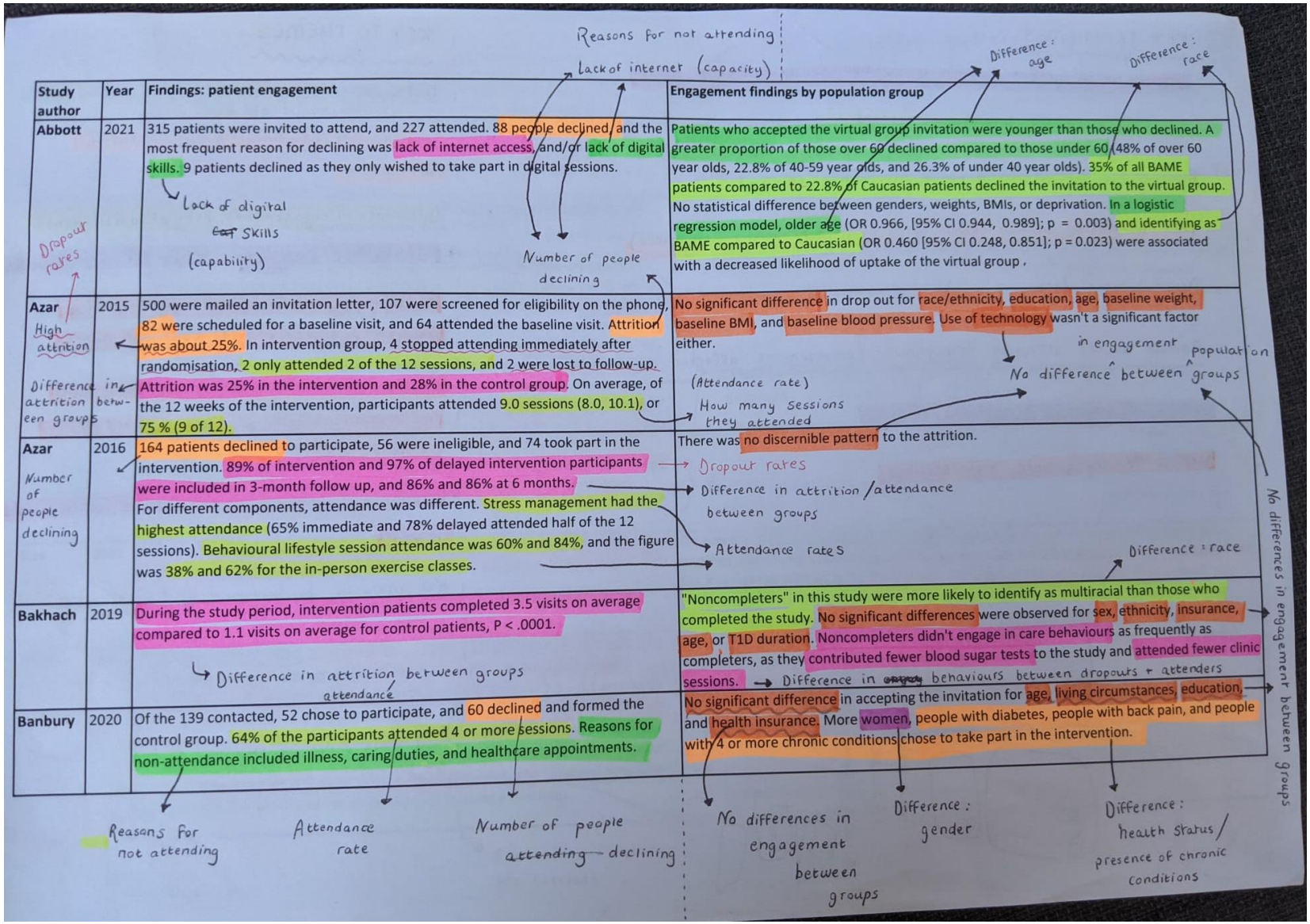
Appendix 8: Samples of original synthesis process – engagement

Synthesis process (engagement): 1) First stage of synthesis – general and by population group



Study author	Year	Findings: patient engagement	Engagement findings by population group
Abbott	2021	315 patients were invited to attend, and 227 attended. 88 people declined, and the most frequent reason for declining was lack of internet access, and/or lack of digital skills. 9 patients declined as they only wished to take part in digital sessions.	Patients who accepted the virtual group invitation were younger than those who declined. A greater proportion of those over 60 declined compared to those under 60 (48% of over 60 year olds, 22.8% of 40-59 year olds, and 26.3% of under 40 year olds). 35% of all BAME patients compared to 22.8% of Caucasian patients declined the invitation to the virtual group. No statistical difference between genders, weights, BMIs, or deprivation. In a logistic regression model, older age (OR 0.966, [95% CI 0.944, 0.989]; p = 0.003) and identifying as BAME compared to Caucasian (OR 0.460 [95% CI 0.248, 0.851]; p = 0.023) were associated with a decreased likelihood of uptake of the virtual group.
Azar	2015	500 were mailed an invitation letter, 107 were screened for eligibility on the phone, 82 were scheduled for a baseline visit, and 64 attended the baseline visit. Attrition was about 25%. In intervention group, 4 stopped attending immediately after randomisation, 2 only attended 2 of the 12 sessions, and 2 were lost to follow-up. Attrition was 25% in the intervention and 28% in the control group. On average, of the 12 weeks of the intervention, participants attended 9.0 sessions (8.0, 10.1), or 75 % (9 of 12).	No significant difference in drop out for race/ethnicity, education, age, baseline weight, baseline BMI, and baseline blood pressure. Use of technology wasn't a significant factor either.
Azar	2016	164 patients declined to participate, 56 were ineligible, and 74 took part in the intervention. 89% of intervention and 97% of delayed intervention participants were included in 3-month follow up, and 86% and 86% at 6 months. For different components, attendance was different. Stress management had the highest attendance (65% immediate and 78% delayed attended half of the 12 sessions). Behavioural lifestyle session attendance was 60% and 84%, and the figure was 38% and 62% for the in-person exercise classes.	There was no discernible pattern to the attrition.
Bakhach	2019	During the study period, intervention patients completed 3.5 visits on average compared to 1.1 visits on average for control patients, P < .0001.	"Noncompleters" in this study were more likely to identify as multiracial than those who completed the study. No significant differences were observed for sex, ethnicity, insurance, age, or T1D duration. Noncompleters didn't engage in care behaviours as frequently as completers, as they contributed fewer blood sugar tests to the study and attended fewer clinic sessions.
Banbury	2020	Of the 139 contacted, 52 chose to participate, and 60 declined and formed the control group. 64% of the participants attended 4 or more sessions. Reasons for non-attendance included illness, caring duties, and healthcare appointments.	No significant difference in accepting the invitation for age, living circumstances, education, and health insurance. More women, people with diabetes, people with back pain, and people with 4 or more chronic conditions chose to take part in the intervention.

KEY TO THEMES

Difference in engagement between intervention groups and other groups

Attendance within intervention groups

Reasons for not attending the 8 intervention sessions

Pre-intervention dropout (declining to participate in the first place)

Dropout rates (after enrolling)

Adverse events affecting engagement (engagement affected by adverse events).

Benefits of engaging with online sessions

Barriers to engagement with sessions

diagram

KEY TO THEMES

Difference in engagement: age of participants

Difference in engagement: health status of participants

Difference in engagement: race of participants

* Difference in engagement: gender of participants

No significant difference in characteristics between completers and non-completers

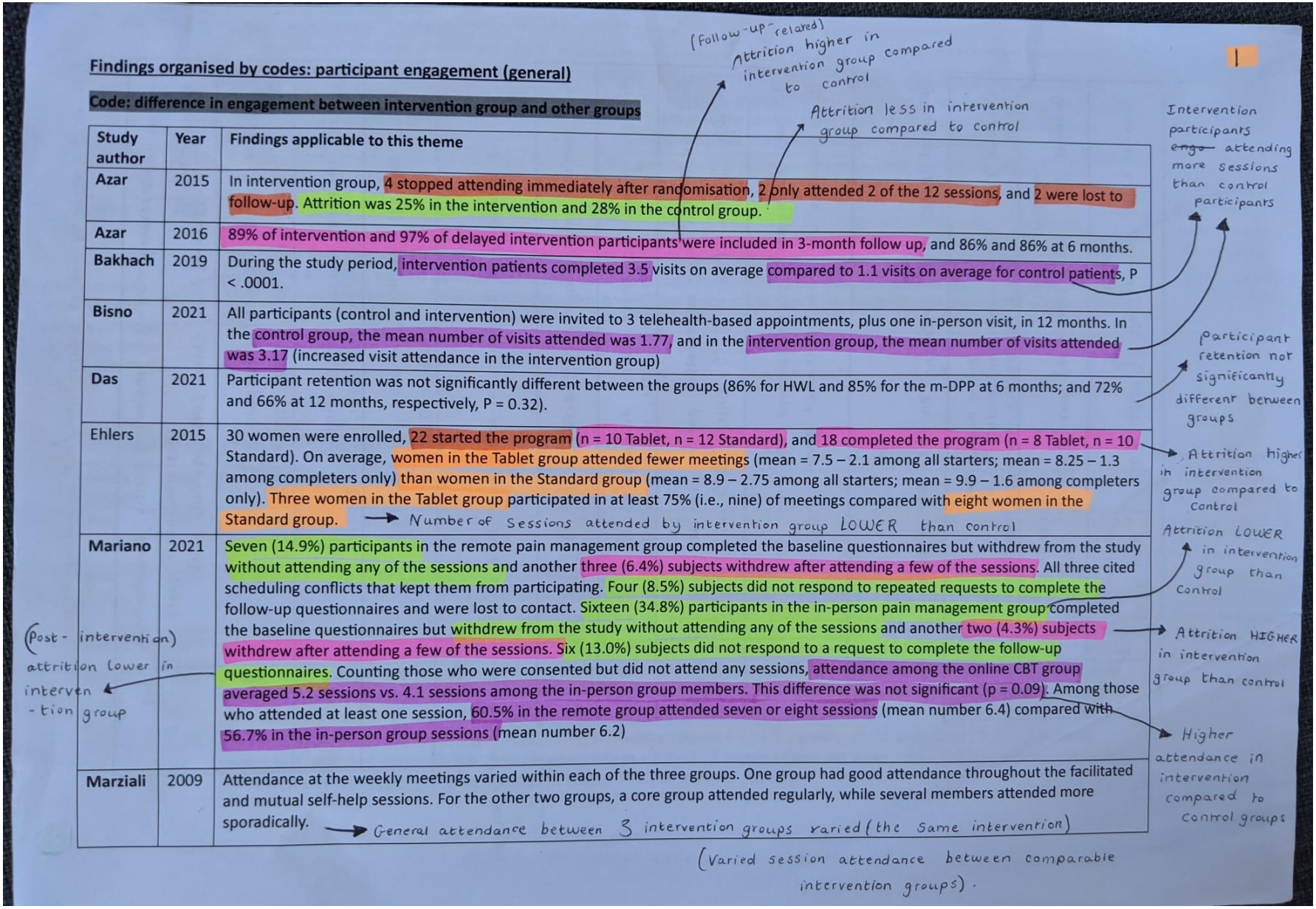
No association between engagement and personal characteristics (more general than the theme above)

* Difference in behaviours between attenders and dropouts

Not analysed by personal characteristics

* 1 study contained this theme.

2) Second stage of synthesis – engagement (general)



Findings organised by codes: participant engagement (general)

Code: difference in engagement between intervention group and other groups

Study author	Year	Findings applicable to this theme
Azar	2015	In intervention group, 4 stopped attending immediately after randomisation, 2 only attended 2 of the 12 sessions, and 2 were lost to follow-up. Attrition was 25% in the intervention and 28% in the control group.
Azar	2016	89% of intervention and 97% of delayed intervention participants were included in 3-month follow up, and 86% and 86% at 6 months.
Bakhach	2019	During the study period, intervention patients completed 3.5 visits on average compared to 1.1 visits on average for control patients, P < .0001.
Bisno	2021	All participants (control and intervention) were invited to 3 telehealth-based appointments, plus one in-person visit, in 12 months. In the control group, the mean number of visits attended was 1.77, and in the intervention group, the mean number of visits attended was 3.17 (increased visit attendance in the intervention group)
Das	2021	Participant retention was not significantly different between the groups (86% for HWL and 85% for the m-DPP at 6 months; and 72% and 66% at 12 months, respectively, P = 0.32).
Ehlers	2015	30 women were enrolled, 22 started the program (n = 10 Tablet, n = 12 Standard), and 18 completed the program (n = 8 Tablet, n = 10 Standard). On average, women in the Tablet group attended fewer meetings (mean = 7.5 – 2.1 among all starters; mean = 8.25 – 1.3 among completers only) than women in the Standard group (mean = 8.9 – 2.75 among all starters; mean = 9.9 – 1.6 among completers only). Three women in the Tablet group participated in at least 75% (i.e., nine) of meetings compared with eight women in the Standard group. → Number of Sessions attended by intervention group LOWER than control
Mariano	2021	Seven (14.9%) participants in the remote pain management group completed the baseline questionnaires but withdrew from the study without attending any of the sessions and another three (6.4%) subjects withdrew after attending a few of the sessions. All three cited scheduling conflicts that kept them from participating. Four (8.5%) subjects did not respond to repeated requests to complete the follow-up questionnaires and were lost to contact. Sixteen (34.8%) participants in the in-person pain management group completed the baseline questionnaires but withdrew from the study without attending any of the sessions and another two (4.3%) subjects withdrew after attending a few of the sessions. Six (13.0%) subjects did not respond to a request to complete the follow-up questionnaires. Counting those who were consented but did not attend any sessions, attendance among the online CBT group averaged 5.2 sessions vs. 4.1 sessions among the in-person group members. This difference was not significant (p = 0.09). Among those who attended at least one session, 60.5% in the remote group attended seven or eight sessions (mean number 6.4) compared with 56.7% in the in-person group sessions (mean number 6.2)
Marziali	2009	Attendance at the weekly meetings varied within each of the three groups. One group had good attendance throughout the facilitated and mutual self-help sessions. For the other two groups, a core group attended regularly, while several members attended more sporadically. → General attendance between 3 intervention groups varied (the same intervention)

(Varied session attendance between comparable intervention groups).

(Follow-up related) Attrition higher in intervention group compared to control

Attrition less in intervention group compared to control

Intervention participants ~~engo~~ attending more sessions than control participants

Participant retention not significantly different between groups

Attrition higher in intervention group compared to control

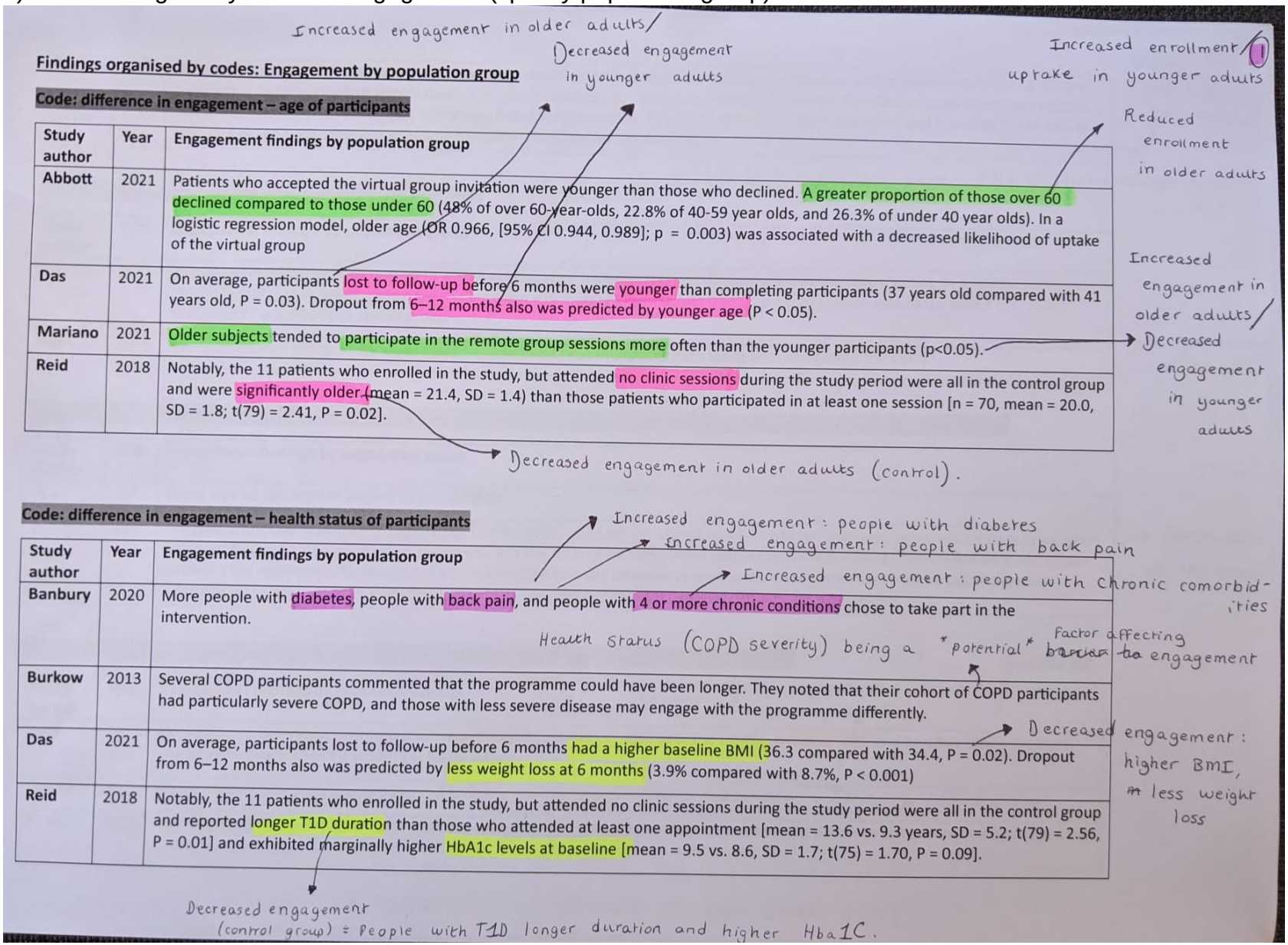
Attrition LOWER in intervention group than control

Attrition HIGHER in intervention group than control

Higher attendance in intervention compared to control groups

(Post-intervention) attrition lower in intervention group

3) Second stage of synthesis – engagement (split by population group)



Increased engagement in older adults

Decreased engagement in younger adults

Increased enrollment / uptake in younger adults

Findings organised by codes: Engagement by population group

Code: difference in engagement – age of participants

Study author	Year	Engagement findings by population group
Abbott	2021	Patients who accepted the virtual group invitation were younger than those who declined. A greater proportion of those over 60 declined compared to those under 60 (48% of over 60-year-olds, 22.8% of 40-59 year olds, and 26.3% of under 40 year olds). In a logistic regression model, older age (OR 0.966, [95% CI 0.944, 0.989]; p = 0.003) was associated with a decreased likelihood of uptake of the virtual group
Das	2021	On average, participants lost to follow-up before 6 months were younger than completing participants (37 years old compared with 41 years old, P = 0.03). Dropout from 6–12 months also was predicted by younger age (P < 0.05).
Mariano	2021	Older subjects tended to participate in the remote group sessions more often than the younger participants (p<0.05).
Reid	2018	Notably, the 11 patients who enrolled in the study, but attended no clinic sessions during the study period were all in the control group and were significantly older (mean = 21.4, SD = 1.4) than those patients who participated in at least one session [n = 70, mean = 20.0, SD = 1.8; t(79) = 2.41, P = 0.02].

Reduced enrollment in older adults

Increased engagement in older adults

Decreased engagement in younger adults

Decreased engagement in older adults (control).

Code: difference in engagement – health status of participants

Study author	Year	Engagement findings by population group
Banbury	2020	More people with diabetes, people with back pain, and people with 4 or more chronic conditions chose to take part in the intervention.
Burkow	2013	Several COPD participants commented that the programme could have been longer. They noted that their cohort of COPD participants had particularly severe COPD, and those with less severe disease may engage with the programme differently.
Das	2021	On average, participants lost to follow-up before 6 months had a higher baseline BMI (36.3 compared with 34.4, P = 0.02). Dropout from 6–12 months also was predicted by less weight loss at 6 months (3.9% compared with 8.7%, P < 0.001)
Reid	2018	Notably, the 11 patients who enrolled in the study, but attended no clinic sessions during the study period were all in the control group and reported longer T1D duration than those who attended at least one appointment [mean = 13.6 vs. 9.3 years, SD = 5.2; t(79) = 2.56, P = 0.01] and exhibited marginally higher HbA1c levels at baseline [mean = 9.5 vs. 8.6, SD = 1.7; t(75) = 1.70, P = 0.09].

Increased engagement: people with diabetes

Increased engagement: people with back pain

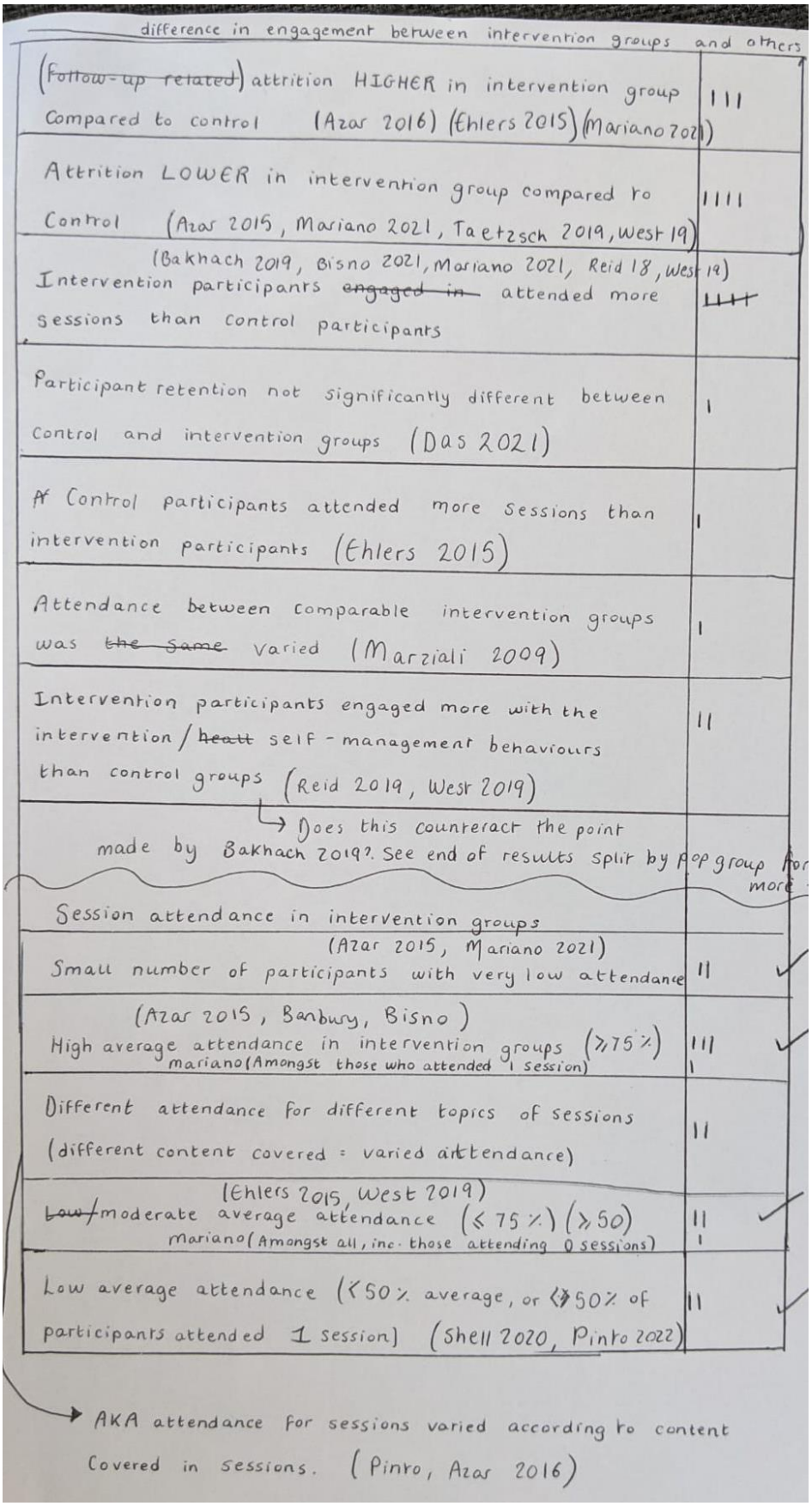
Increased engagement: people with chronic comorbidities

Health status (COPD severity) being a "potential" factor affecting ~~barrier to~~ engagement

Decreased engagement: higher BMI, less weight loss

Decreased engagement (control group) = People with T1D longer duration and higher HbA1C.

4) Third stage of synthesis – re-organising codes (engagement)



difference in engagement between intervention groups and others

~~(Follow-up related)~~ attrition HIGHER in intervention group Compared to control (Azar 2016) (Ehlers 2015) (Mariano 2021)	III
Attrition LOWER in intervention group compared to Control (Azar 2015, Mariano 2021, Taetzsch 2019, West 19)	IIII
Intervention participants ~~engaged in~~ attended more sessions than control participants (Bakhach 2019, Bisno 2021, Mariano 2021, Reid 18, West 19)	~~IIII~~
Participant retention not significantly different between Control and intervention groups (Das 2021)	I
~~A~~ Control participants attended more sessions than intervention participants (Ehlers 2015)	I
Attendance between comparable intervention groups was ~~the same~~ varied (Marziali 2009)	I
Intervention participants engaged more with the intervention / ~~health~~ self-management behaviours than control groups (Reid 2019, West 2019)	II

→ Does this counteract the point made by Bakhach 2019? See end of results split by pop group for more

Session attendance in intervention groups

Small number of participants with very low attendance (Azar 2015, Mariano 2021)	II ✓
High average attendance in intervention groups (≥75%) (Azar 2015, Banbury, Bisno) Mariano (Amongst those who attended 1 session)	III ✓
Different attendance for different topics of sessions (different content covered = varied attendance)	II
~~Low~~/moderate average attendance (≤75%) (≥50) (Ehlers 2015, West 2019) Mariano (Amongst all, inc. those attending 0 sessions)	II ✓
Low average attendance (<50% average, or <50% of participants attended 1 session) (Shell 2020, Pinto 2022)	II ✓

→ AKA attendance for sessions varied according to content Covered in sessions. (Pinto, Azar 2016)

Appendix 9: Reasons for exclusion at full text screening stage

Title	Authors	Published Year	Journal	Exclusion reason
Virtually delivering a diabetes prevention programme (Healthier You) increases accessibility and equity	Johnson V.; Harrison S.; Lewin J.; Troughton J.; Stribling B.	2021	Diabetic Medicine	Conference abstract
CoDES (Community Diabetes Education and Support): Offering a bespoke approach to education and support for holistic primary care in type 2 diabetes	Milne N.; Di-Rosa F.; Rutter M.K.; Kanumilli N.; Findlow L.; Fletcher S.	2021	Diabetic Medicine	Conference abstract
Improving virtual integrative medical group visits for patients with chronic pain: Lessons learned during the COVID-19 pandemic	Tiedt M.; Gardiner P.; Leeman J.; Gaylord S.; Miller V.; Faurot K.; Karvelas K.; Barnhill J.; Chilcoat A.; Roth I.	2021	Global Advances in Health and Medicine	Conference abstract
Experiences of online yoga for older adults with multi-morbidity in The Gentle Years Yoga Trial	Ward L.; Tew G.; Rapley T.; on behalf of the GYY Study Group	2021	European Journal of Integrative Medicine	Conference abstract
Delivering a dietetic intervention to cardiovascular patients in the Covid era	Rodgers A.; Edwards W.; Garrity J.; Latimer D.; Wilson D.; Connolly S.	2021	European Journal of Preventive Cardiology	Conference abstract
Shared telemedicine appointments for young adults with T1D and depressive symptoms-improved attendance and symptom regulation	Reid M.W.; Raymond J.; Thomas J.F.	2018	Diabetes	Conference abstract

Implementing a virtual intensive lifestyle intervention program in a food desert	Coppiano J.; Walters C.; Tierney C.; Bramwell C.; Hayes H.; Sams R.	2022	Clinical Journal of Sport Medicine	Conference abstract
Feasibility of a Flash Glucose Sensor Enabled Virtual Lifestyle Management Group in Patients With Type 2 Diabetes (T2DM): The STAND Study	Reichert S.; Hiemstra M.; Harvey E.; Mikalachki A.; Mitchell M.	2021	Canadian Journal of Diabetes	Conference abstract
Hospital use and cost among minority women enrolled in the women in control (WIC) virtual world diabetes self-management education (DSME) comparative effectiveness trial	Mitchell S.; Bragg A.; Howard J.M.; Gardiner P.	2020	Diabetes	Conference abstract
Virtual shared medical appointments for veterans with type ii diabetes-an inter professional trainee driven quality improvement pilot	Archibald T.; Ambert-Pompey S.; Izzi M.; Fisher A.; Masi T.	2021	Journal of General Internal Medicine	Conference abstract
Home-based cardiac rehabilitation-the real barriers of programs at distance	Brito J.; Aguiar-Ricardo I.; Alves Da Silva P.; Valente Da Silva B.; Cunha N.; Couto Pereira S.; Silverio Antonio P.; Pinto R.; Lemos Pires M.; Santos O.; Sousa P.; Pinto F.J.; Breu A.	2021	European Journal of Preventive Cardiology	Conference abstract
Home telemedicine significantly improves diabetes distress in young adults with type 1 diabetes	Bakhach M.; Cain C.; Berget C.; Ketchum K.; Reid M.; Thomas J.F.; Klingensmith G.; Raymond J.	2017	Pediatric Diabetes	Conference abstract

Bridge to liver wellness: An app-led telehealth group intervention	Brandman D.; Catalli L.; Miller S.	2021	Hepatology	Conference abstract
Digital home-based multidisciplinary cardiac rehabilitation: The way to counteract physical inactivity during the COVID-19 pandemic?	Pinto R.; Lemos Pires M.; Borges M.; Linan Pinto M.; Sousa Guerreiro C.; Miguel S.; Santos O.; Ramalhinho M.; Fiuza S.; Cordeiro Ferreira M.; Ricardo I.; Cunha N.; Alves Da Silva P.; Pinto F.J.; Abreu A.	2021	European Journal of Preventive Cardiology	Conference abstract
Effects of a digital diabetes prevention program on hba1c and body weight in prediabetes	Katula J.; Dressler E.; Kittle C.; Almeida F.; Wilson K.; Michaud T.; Porter G.; Brito F.; Jasik C.; Francisco CA S.; Sweet C.C.; Schwab R.; Estabrooks P.	2020	Obesity	Conference abstract
POS-937 "#LOOKING_TO_STAY_CONNECTED": CHARACTERISTICS OF PATIENTS WITH ESRD AND FAMILY CAREGIVERS WHO SIGNED UP FOR AN ONLINE INTERVENTION DURING THE COVID-19 PANDEMIC	FIGUEIREDO D.; Sousa H.; Bartolo A.; Oliveira J.; Rodrigues M.; Paul C.; Costa E.; Ribeiro F.; Ribeiro O.	2022	Kidney International Reports	Conference abstract
Home-based cardiac rehabilitation in covid era: Is it a safe option?	Couto Pereira S.; Aguiar-Ricardo I.; Pinto R.; Cunha N.; Alves Da Silva P.; Rodrigues T.; Silverio Antonio P.; Valente Silva	2021	European Journal of Preventive Cardiology	Conference abstract

	B.; Brito J.; Borges M.; Lemos Pires M.; Miguel S.; Salazar F.; Pinto F.J.; Abreu A.			
How do patient attendees rate virtual group education: Our initial findings?	Northern A.; Brant F.; Douglas T.; Farmer J.; Harrison S.; Johnson V.; Rodgers A.; Troughton J.; Davies M.J.	2021	Diabetic Medicine	Conference abstract
Acceptability of a virtual group-based type 2 diabetes remission programme in an ethnically diverse, socio-economically deprived population: Preliminary results from an NHS England low-calorie diet programme pilot area	Chadwick P.M.; Barnes A.C.; MacMillan H.J.; Gilbert N.; Fallows E.	2021	Diabetic Medicine	Conference abstract
Impact of web-based health promotion program and online nutrition education intervention for metabolic syndrome patients: Effects on lipid profiles and inflammation	Nurwanti E.; Bai C.-H.	2019	Annals of Nutrition and Metabolism	Conference abstract
Transitioning a cardiovascular health and rehabilitation programme to a virtual platform during covid 19	Mcgaffin S.; Taggart M.; Smyth D.; O'doherty D.; Brown J.; Teague S.; Slevin C.; Montgomery L.; Coll M.; Lindsay C.; Crumley B.; Gibson L.; Elliott H.; Hughes S.; Connolly S.	2021	European Journal of Cardiovascular Nursing	Conference abstract

Implementation fidelity of a complex behavioral intervention to prevent diabetes mellitus in two safety net patient-centered medical homes in New York City	Gupta A.; Hu J.; Huang S.; Diaz L.; Gore R.; Islam N.S.; Schwartz M.D.	2021	Journal of General Internal Medicine	Conference abstract
The effect of an ACT and mindfulness group intervention on psychological and physical well-being of adults struggling with overweight: A preliminary study	Iturbe I.; Urkia I.; Pereda Pereda E.; Echeburua E.; Maiz E.	2021	Obesity Facts	Conference abstract
Group appointments (GA) via home telehealth (HT) for young adults (YA) with type 1 diabetes (T1D) may improve psychosocial functioning	Bisno D.I.; Reid M.W.; Berget C.; Cain C.L.; Klingensmith G.J.; Raymond J.	2019	Diabetes	Conference abstract
Diabetes education through shared medical appointment: Utilizing digital health-a comparison of platforms and integrating devices with result review	Faiman M.; Hustak L.K.; Maggiore A.J.; Sumego M.	2019	Diabetes	Conference abstract
Virtual clinics for chronic lung diseasecomparison and learning from patient groups in primary care & integrated respiratory care services	Cornwallis J.; Purlackee S.; Ahmed A.; Hassan R.; Ng-Man-Kwong G.	2017	Thorax	Conference abstract
The expansion of CoYoT1: Virtual diabetes care for the COVID-19 pandemic	Raymond J.K.; Flores Garcia J.; Salcedo Rodriguez E.; Torres Sanchez A.; Fogel J.; Reid M.; Vidmar A.; Cheung C.	2021	Pediatric Diabetes	Conference abstract

Intuitive eating changes after a behavioral multisession group intervention for dietary management of women with CKD	Pereira R.A.; Alvarenga M.; Andrade L.S.; Teixeira R.R.; Teixeira P.C.; Da Silva W.R.; Cuppari L.	2021	Nephrology Dialysis Transplantation	Conference abstract
The effect of home-based cardiac rehabilitation program on change in body mass index	Grover S.; Drwal K.; Wakefield B.; Zhou Y.; Accaoui R.E.	2018	Journal of Cardiopulmonary Rehabilitation and Prevention	Conference abstract
Revolutionising access and outcomes in Type 2 diabetes structured education programmes through remote care	Jones L.; Diamond L.; Jenkins M.; Adu S.; Vallis R.	2018	Diabetic Medicine	Conference abstract
Cost effectiveness of a telehealth-based diabetes self-management (DSME) intervention in a rural community	Davis R.; Mayer-Davis E.J.	2011	Diabetes	Conference abstract
Process evaluation of "employment & arthritis: Making it work", an online program to help people with inflammatory arthritis maintain employment	Seah X.; Rogers P.; Backman C.; Goldsmith C.; Gignac M.; Li L.; Esdaile J.; Lacaille D.	2016	Journal of Rheumatology	Conference abstract
Participants' experience of the making it work program, an online program to help people with inflammatory arthritis remain employed	Li A.; Backman C.; Van As B.; Rogers P.; Gignac M.; Li L.; Esdaile J.; Lacaille D.	2017	Annals of the Rheumatic Diseases	Conference abstract
CoYoT1 Clinic: Diabetes care from your sofa (Colorado Young Adults with T1D)	Berget C.; Ketchum K.; Shea J.; Raymond J.	2015	Pediatric Diabetes	Conference abstract

Process evaluation of the making it work program, an online program to help people with inflammatory arthritis remain employed	Tran K.; Li X.Y.; Seah X.C.; Backman C.; VanAs B.; Rogers P.; Gignac M.; Esdaile J.M.; Thorne C.; Li L.; Lacaille D.	2017	Arthritis and Rheumatology	Conference abstract
Implementation evaluation and fidelity assessment of a diabetes management intervention during the COVID-19 pandemic: Findings from the diabetes research, education, and action for minorities (DREAM) initiative	Ali S.H.; Mohaimin S.; Islam T.; Mammen S.; Zanowiak J.; Wyatt L.; Lim S.; Islam N.S.	2021	Journal of General Internal Medicine	Conference abstract
A functional integrative restoration (FINER) spine program: An interdisciplinary virtual care pilot study	Sarno D.; Kurz J.L.; Chin B.S.; Turcu R.; Flynn P.J.; Fortino M.; Kulich R.; Isaac Z.	2021	PM and R	Conference abstract
Development of adapted, Covid secure pain management programmes: Preliminary outcomes	Heelas L.; Wiltshire S.; Nicholas J.; Barker K.	2022	Physiotherapy (United Kingdom)	Conference abstract
From the classroom to the living room: Delivering structured education to people living with type 2 diabetes during a pandemic	Alayyan G.S.; Beckwith L.J.; Kirby I.L.; Pomeroy K.A.; Price H.C.; Sims S.A.	2021	Diabetic Medicine	Conference abstract
Overcoming isolation: Creation of a local, online peer support group	Buchanan M.L.; Jones B.W.; Goralski J.L.; Donaldson S.H.	2018	Pediatric Pulmonology	Conference abstract
Social identity theory and telehealth: A new behavioral approach to frame diabetes self-management	Davis R.	2012	Diabetes	Conference abstract

Change in cardiorespiratory fitness before and during the pandemic in a cardiac rehabilitation program: An age, sex, smoking status, and diagnosis matched study	Vanzella L.M.; Carvalho C.; Cotie L.; Sandison N.; Marzolini S.	2021	Journal of Cardiopulmonary Rehabilitation and Prevention	Conference abstract
User experiences and perceived effectiveness of an eHealth self-management intervention in COPD patients with heart failure	Lenferink A.; Sloots J.; Ramlal A.; Van Der Valk P.; Effing T.; Van Der Palen J.; Drossaert C.	2020	European Respiratory Journal	Conference abstract
Early results on the efficacy and acceptability of a cardiac rehabilitation programme that transitioned to a fully virtual platform with adoption of wearable technology for covid era	Connolly S.B.; Jones J.L.; Jennings C.; Neubeck L.; Wood D.A.	2021	European Heart Journal	Conference abstract
Community Diabetes Belfast	Magee G.M.	2019	Irish Journal of Medical Science	Conference abstract
A remote OASIS: Implementing clinical guidelines over a virtual platform	Roberts S.; Busby E.	2022	Physiotherapy (United Kingdom)	Conference abstract
Reconnect2life - Getting comfortable being uncomfortable: Using telerehabilitation to support patients with chronic pain during Covid-19	Newton-Cross P.; Howell A.; Roche K.; Neal M.; Bird N.; Skett L.; Hornewood A.; Riley L.; Dewar J.; Brockington C.; Knowles E.	2022	Physiotherapy (United Kingdom)	Conference abstract
Comparing the effectiveness of different educational modalities for improving diabetes knowledge and foot care behaviours in type 2 diabetes	Formosa C.; Montebello K.; Gatt A.	2019	Diabetic Medicine	Conference abstract

Efficacy of a psychotherapeutic group on patients with obesity and hypertension	Gabos P.; Watanabe D.; Bortolotto L.A.	2021	Journal of Hypertension	Conference abstract
Reported psychosocial status following a 12-week home-based cardiac rehabilitation program	Grover S.; Drwal K.; Wakefield B.; Zhou Y.; Accaoui R.E.	2018	Journal of Cardiopulmonary Rehabilitation and Prevention	Conference abstract
Coyot1 (colorado young adults with type 1 diabetes) clinic: Feasibility of home-based telemedicine in young adults	Ketchum K.; Berget C.; Cain C.; Thomas F.; Raymond J.	2016	Diabetes	Conference abstract
Accuracy of self-reported weights recorded online: Results from the power trial at hopkins	Jerome G.J.; Wang N.-Y.; Durkin N.; Charleston J.; Fitzpatrick S.; Daumit G.L.; Rubin R.R.; Clark J.M.; Dalcin A.; Coughlin J.W.; Yeh H.-C.; Louis T.A.; Appel L.J.	2013	Circulation	Conference abstract
Recruitment and retention of minority women for women in control 2.0: A virtual diabetes self-management education study	Bragg A.; Gardiner P.; Woods S.B.; Howard J.M.; Mitchell S.	2020	Diabetes	Conference abstract
Can you see me Participant experience of accessing a weight management programme via group videoconference to overcome barriers to engagement in rural areas	Cliffe M.; Bishop S.; Williams S.	2020	Obesity Reviews	Conference abstract

Depressive symptom severity as a predictor of attendance in the home behavioral weight loss trial	Shell A.L.; Hsueh L.; Vrany E.A.; Clark D.O.; Keith N.R.; Xu H.; Stewart J.C.	2018	Psychosomatic Medicine	Conference abstract
Application and effect evaluation on Internet + home care mobile APP in patients with type 2 diabetes in young and middle-age.	Dai Limin; Huo Xiaorong; Mo Yongzhen	2018	Chinese Nursing Research	Not in English
The feasibility of group video conferencing for promotion of physical activity in adolescents with intellectual and developmental disabilities.	Ptomey, Lauren T; Willis, Erik A; Greene, J. Leon; Danon, Jessica C; Chumley, Tara K; Washburn, Richard A; Donnelly, Joseph E	2017	American Journal on Intellectual and Developmental Disabilities	Pediatic population
Blended face-to-face and online/computer-based education approaches in chronic disease self-management: A critical interpretive synthesis.	Sangrar, Ruheena; Docherty-Skippen, Susan Maureen; Beattie, Karen	2019	Patient Education and Counseling	Review, no relevant references found
The impact of the telerehabilitation group aphasia intervention and networking programme on communication, participation, and quality of life in people with aphasia.	Pitt, Rachelle; Theodoros, Deborah; Hill, Anne J; Russell, Trevor	2019	International journal of speech-language pathology	Wrong intervention
The effect of a motivational intervention on weight loss is moderated by level of baseline controlled motivation	Webber K.H.; Gabriele J.M.; Tate D.F.; Dignan M.B.	2010	International Journal of Behavioral Nutrition and Physical Activity	Wrong intervention

Effectiveness of a Nurse-Led Web-Based Health Management in Preventing Women With Gestational Diabetes From Developing Metabolic Syndrome.	SU, Mei-Chen; CHAO, An-Shine; CHANG, Min-Yu; CHANG, Yao-Lung; CHEN, Chien-Lan; SUN, Jui-Chiung	2021	Journal of Nursing Research (Lippincott Williams & Wilkins)	Wrong intervention
Weight management telehealth intervention for overweight and obese rural cardiac rehabilitation participants: A randomised trial.	Barnason, Susan; Zimmerman, Lani; Schulz, Paula; Pullen, Carol; Schuelke, Sue	2019	Journal of Clinical Nursing (John Wiley & Sons, Inc.)	Wrong intervention
Web-Based Interventions Alone or Supplemented with Peer-Led Support or Professional Email Counseling for Weight Loss and Weight Maintenance in Women from Rural Communities: Results of a Clinical Trial.	Hageman, Patricia A.; Pullen, Carol H.; Hertzog, Melody; Pozehl, Bunny; Eisenhauer, Christine; Boeckner, Linda S.	2017	Journal of Obesity	Wrong intervention
Efficacy of an experiential, dissonance-based smoking intervention for college students delivered via the internet.	Simmons, Vani Nath; Heckman, Bryan W; Fink, Angelina C; Small, Brent J; Brandon, Thomas H	2013	Journal of consulting and clinical psychology	Wrong intervention
Feasibility, safety and effectiveness of remote pulmonary rehabilitation during COVID-19 pandemic	Grosbois J.-M.; Gephine S.; Le Rouzic O.; Chenivesse C.	2021	Respiratory Medicine and Research	Wrong intervention
Do individual, online motivational interviewing chat sessions enhance weight loss in a group-based, online weight control program?.	West, Delia Smith; Harvey, Jean R; Krukowski, Rebecca A; Prewitt, T Elaine; Priest, Jeffrey; Ashikaga, Takamaru	2016	Obesity (Silver Spring, Md.)	Wrong intervention

Comparison of Smartphone-Based Behavioral Obesity Treatment With Gold Standard Group Treatment and Control: A Randomized Trial.	Thomas, J Graham; Bond, Dale S; Raynor, Hollie A; Papandonatos, George D; Wing, Rena R	2019	Obesity (Silver Spring, Md.)	Wrong intervention
A Self-management Approach for Dietary Sodium Restriction in Patients With CKD: A Randomized Controlled Trial.	Humalda, Jelmer K; Klaassen, Gerald; de Vries, Hanne; Meuleman, Yvette; Verschuur, Lara C; Straathof, Elisabeth J M; Laverman, Gozewijn D; Bos, Willem Jan W; van der Boog, Paul J M; Vermeulen, Karin M; Blanson Henkemans, Olivier A; Otten, Wilma; de Borst, Martin H; van Dijk, Sandra; Navis, Gerjan J; SUBLIME Investigators	2020	American journal of kidney diseases : the official journal of the National Kidney Foundation	Wrong intervention
Telerehabilitation Programme as a Maintenance Strategy for COPD Patients: A 12-Month Randomized Clinical Trial	Galdiz J.B.; Gomez A.; Rodriguez D.; Guell R.; Cebollero P.; Hueto J.; Cejudo P.; Ortega F.; Sayago I.; Chic S.; Iscar M.; Amado C.; Rodriguez Trigo G.; Cosio B.G.; Bustamante V.; Pijoan J.I.	2021	Archivos de Bronconeumologia	Wrong intervention

A randomized controlled trial of a web-based education intervention for women with gestational diabetes mellitus.	Carolan-Olah, Mary; Sayakhot, Padaphet	2019	Midwifery	Wrong intervention
Impact of a Web-Based Exercise and Nutritional Education Intervention in Patients Who Are Obese With Hypertension: Randomized Wait-List Controlled Trial.	LisÃ³n, Juan Francisco; Palomar, Gonzalo; Mensorio, Marinna S; BaÃ±os, Rosa M; Cebolla-MartÃ, AusiÃ s; Botella, Cristina; Benavent-Caballer, Vicent; Rodilla, Enrique	2020	Journal of Medical Internet Research	Wrong intervention
Effects of internet-based pain coping skills training before home exercise for individuals with hip osteoarthritis (HOPE trial): A randomised controlled trial.	Bennell, Kim L; Nelligan, Rachel K; Rini, Christine; Keefe, Francis J; Kasza, Jessica; French, Simon; Forbes, Andrew; Dobson, Fiona; Abbott, J. Haxby; Dalwood, Andrew; Harris, Anthony; Vicenzino, Bill; Hodges, Paul W; Hinman, Rana S	2018	Pain	Wrong intervention
A prospective comparison of telemedicine versus in-person delivery of an interprofessional education program for adults with inflammatory arthritis.	Kennedy, Carol A; Warmington, Kelly; Flewelling, Carol; Shupak, Rachel; Papachristos, Angelo; Jones, Caroline; Linton, Denise; Beaton,	2017	Journal of Telemedicine and Telecare	Wrong intervention

	Dorcas E; Lineker, Sydney; Hogg-Johnson, Sheilah			
A tailored-guided internet-based cognitive-behavioral intervention for patients with rheumatoid arthritis as an adjunct to standard rheumatological care: results of a randomized controlled trial.	Ferwerda, Maaike; van Beugen, Sylvia; van Middendorp, HenriÃ«t; Spillekom-van Koulil, Saskia; Donders, A. Rogier T.; Visser, Henk; Taal, Erik; Creemers, Marjonne C. W.; van Riel, Piet C. L. M.; Evers, Andrea W. M.	2017	PAIN	Wrong intervention
Telemedicine cardiovascular risk reduction in veterans: The CITIES trial.	Bosworth, Hayden B; Olsen, Maren K; McCant, Felicia; Stechuchak, Karen M; Danus, Susanne; Crowley, Matthew J; Goldstein, Karen M; Zullig, Leah L; Oddone, Eugene Z	2018	American heart journal	Wrong intervention
Feasibility of using videoconferencing to provide diabetes education: a pilot study.	Timmerberg, Brady D; Wurst, Jennie; Patterson, James; Spaulding, Ryan J; Belz, Norbert E	2009	Journal of telemedicine and telecare	Wrong intervention
Using mHealth to Deliver Behavior Change Interventions Within Prenatal Care at Community Health Centers.	Mauriello, Leanne M.; Van Marter, Deborah F.; Umanzor, Cindy D.; Castle,	2016	American Journal of Health Promotion	Wrong intervention

	Patricia H.; de Aguiar, Emma L.			
Internet based ophthalmology service: Impact assessment [15]	Kumar S.; Tay-Kearney M.-L.; Constable I.J.; Yogesan K.	2005	British Journal of Ophthalmology	Wrong intervention
Mentored implementation to initiate a diabetes program in an underserved community: A pilot study	Vaughan E.M.; Naik A.D.; Amspoker A.B.; Johnston C.A.; Landrum J.D.; Balasubramanyam A.; Virani S.S.; Ballantyne C.M.; Foreyt J.P.	2021	BMJ Open Diabetes Research and Care	Wrong intervention
HypoAware: Development and pilot study of a brief and partly web-based psychoeducational group intervention for adults with Type 1 and insulin-treated Type 2 diabetes and problematic hypoglycaemia	Rondags S.M.P.A.; de Wit M.; Snoek F.J.	2016	Diabetic Medicine	Wrong intervention
Adherence to a web-based physical activity intervention for patients with knee and/or hip osteoarthritis: A mixed method study.	Bossen, Daniel; Buskermolen, Michelle; Veenhof, Cindy; de Bakker, Dinny; Dekker, Joost	2013	Journal of Medical Internet Research	Wrong intervention
Distance learning strategies for weight management utilizing online social networks versus group phone conference call	Willis E.A.; Szabo-Reed A.N.; Ptomey L.T.; Steger F.L.; Honas J.J.; Al-Hihi E.M.; Lee R.; Lee J.; Oh Y.; Washburn R.A.; Donnelly J.E.	2017	Obesity Science and Practice	Wrong intervention

Chronic illness experience of isolated rural women: Use of an online support group intervention.	Winters, Charlene A; Sullivan, Therese	2013	Rural nursing: Concepts, theory, and practice., 4th ed.	Wrong intervention
A pilot test of the GoWoman weight management intervention for women with mobility impairments in the online virtual world of Second Life R.	Nosek, Margaret A; Robinson-Whelen, Susan; Ledoux, Tracey A; Hughes, Rosemary B; O'Connor, Daniel P; Lee, Rebecca E; Goe, Rebecca; Silveira, Stephanie L; Markley, Rachel; Nosek, Thomas M; GoWoman Consortium	2019	Disability and rehabilitation	Wrong intervention
Spanning boundaries into remote communities: an exploration of experiences with telehealth chronic disease self-management programs in rural northern ontario, Canada.	Guilcher, Sara J T; Bereket, Tarik; Voth, Jennifer; Haroun, Vinita A; Jaglal, Susan B	2013	Telemedicine journal and e-health : the official journal of the American Telemedicine Association	Wrong intervention
Investigating innovative means of prompting activity uptake in older adults with type 2 diabetes: a feasibility study of exergaming.	SENIOR, Hugh; HENWOOD, Tim; DE SOUZA, Daniel; MITCHELL, Geoffrey	2016	Journal of Sports Medicine & Physical Fitness	Wrong intervention

Participant perspectives on benefits and challenges of engaging in an online pain self-management program.	Wilson, Marian; Shaw, Michele R	2020	Alternative pain management: Solutions for avoiding prescription drug overuse.	Wrong intervention
Access to a behavioral weight loss website with or without group sessions increased weight loss in statewide campaign	Mateo K.F.; Jay M.	2014	Journal of Clinical Outcomes Management	Wrong intervention
Social interactions in an online self-management program for rheumatoid arthritis.	Shigaki, Cheryl L; Smarr, Karen L; Gong, Yang; Donovan-Hanson, Kathleen; Siva, Chokkalingam; Johnson, Rebecca A; Ge, Bin; Musser, Dale R	2008	Chronic Illness	Wrong intervention
The effect of social support features and gamification on a web-based intervention for rheumatoid arthritis patients: randomized controlled trial.	Allam, Ahmed; Kostova, Zlatina; Nakamoto, Kent; Schulz, Peter Johannes	2015	Journal of Medical Internet Research	Wrong intervention
Online and In-Person Nutrition Education Improves Breakfast Knowledge, Attitudes, and Behaviors: A Randomized Trial of Participants in the Special Supplemental Nutrition Program for Women, Infants, and Children.	Au, Lauren E; Whaley, Shannon; Rosen, Nila J; Meza, Martha; Ritchie, Lorrene D	2016	Journal of the Academy of Nutrition and Dietetics	Wrong intervention

Effect of an Online Weight Management Program Integrated With Population Health Management on Weight Change: A Randomized Clinical Trial.	Baer, Heather J; Rozenblum, Ronen; De La Cruz, Barbara A; Orav, E John; Wien, Matthew; Nolido, Nyryan V; Metzler, Kristina; McManus, Katherine D; Halperin, Florencia; Aronne, Louis J; Minero, Guadalupe; Block, Jason P; Bates, David W	2020	JAMA	Wrong intervention
Experiences From a Web- and App-Based Workplace Health Promotion Intervention Among Employees in the Social and Health Care Sector Based on Use-Data and Qualitative Interviews.	Balk-MÃ¸ller, Nina Charlotte; Larsen, Thomas Meinert; Holm, Lotte	2017	Journal of Medical Internet Research	Wrong intervention
A prospective randomized controlled study of a virtual clinic integrating primary and specialist care for patients with Type 2 diabetes mellitus.	Basudev, N.; Crosbyâ€• Nwaobi, R.; Thomas, S.; Chamley, M.; Murrells, T.; Forbes, A.	2016	Diabetic Medicine	Wrong intervention
Accessible weight loss: Adapting a lifestyle intervention for adults with impaired mobility.	Betts, Andrea C; Froehlich-Grobe, Katherine	2017	Disability and Health Journal	Wrong intervention
A pilot study of StopAdvisor: A theory-based interactive internet-based smoking cessation intervention aimed across the social spectrum.	Brown, Jamie; Michie, Susan; Geraghty, Adam W. A; Miller, Sascha; Yardley, Lucy; Gardner, Benjamin; Shahab, Lion; Stapleton, John A; West, Robert	2012	Addictive Behaviors	Wrong intervention

Development and preliminary pilot evaluation of a brief tablet computer intervention to motivate tobacco quitline use among smokers in substance use treatment	Brown R.A.; Hecht J.; Bloom E.L.; Minami H.; Kahler C.W.; Abrantes A.M.; Dubreuil M.E.; Gordon A.; Price L.H.; Ondersma S.J.	2017	American Journal on Addictions	Wrong intervention
An internet-delivered cognitive behavioural therapy pain management programme for spinal cord injury pain: A randomized controlled trial.	Burke, Dearbhla; Lennon, Olive; Blake, Catherine; Nolan, Maeve; Barry, Sorcha; Smith, Eimear; Maye, Fiona; Lynch, John; O'Connor, Lorna; Maume, Liz; Cheyne, Sheena; NÃ Ghiollain, Sadb; Fullen, Brona M.	2019	European Journal of Pain	Wrong intervention
Enhancing physical activity promotion in midlife women with technology-based self-monitoring and social connectivity: A pilot study.	Butryn, Meghan L; Arigo, Danielle; Raggio, Greer A; Colasanti, Marie; Forman, Evan M	2016	Journal of Health Psychology	Wrong intervention
Sustainable improvement of HbA1c and satisfaction with diabetes care after adding telemedicine in patients on adaptable insulin regimens: Results of the TeleDiabetes randomized controlled trial.	Buysse, Heidi; Coremans, Peter; Pouwer, Frans; Ruige, Johannes	2020	Health informatics journal	Wrong intervention

Interdisciplinary weight loss and lifestyle intervention for obstructive sleep apnoea in adults: The INTERAPNEA randomized controlled trial	Carneiro-Barrera A.; Amaro-Gahete F.J.; Jurado-Fasoli L.; Guillen-Riquelme A.; Saez-Roca G.; Martin-Carrasco C.; Ruiz J.R.; Buela-Casal G.	2020	Journal of Sleep Research	Wrong intervention
Mothers In Motion intervention effect on psychosocial health in young, low-income women with overweight or obesity.	Chang, Mei-Wei; Nitzke, Susan; Brown, Roger	2019	BMC Public Health	Wrong intervention
Feasibility, Acceptability, and Clinical Effectiveness of a Technology-Enabled Cardiac Rehabilitation Platform (Physical Activity Toward Health-I): Randomized Controlled Trial.	Claes, Jomme; Cornelissen, VÃ©ronique; McDermott, Clare; Moyna, Niall; Pattyn, Nele; Cornelis, Nils; Gallagher, Anne; McCormack, Ciara; Newton, Helen; Gillain, Alexandra; Budts, Werner; Goetschalckx, Kaatje; Woods, Catherine; Moran, Kieran; Buys, Roselien	2020	Journal of Medical Internet Research	Wrong intervention
An exploration of chronic pain patients' perceptions of home telerehabilitation services.	Cranen, Karlijn; Drossaert, Constance H. C; Brinkman, Evelien S; Braakman-Jansen, Annemarie L. M; IJzerman, Maarten J; Vollenbroek-Hutten, Miriam M. R	2012	Health Expectations: An International Journal of Public Participation in Health Care & Health Policy	Wrong intervention

The effect of a web-based psychoeducation on emotional functioning, eating behaviors, and body image among premenopausal women with excess body weight.	Czepczor-Bernat, Kamila; Brytek-Matera, Anna; Staniszewska, Anna	2021	Archives of Women's Mental Health	Wrong intervention
Telecoaching programme for type 2 diabetes control: a randomised clinical trial.	de Vasconcelos, HÃ©rica Cristina Alves; Lira Neto, JosÃ© Claudio Garcia; de AraÃºjo, MÃ¡rcio FlÃ¡vio Moura; Carvalho, Gerdane Celene Nunes; de Souza Teixeira, Carla Regina; de Freitas, Roberto Wagner JÃºnior Freire; Damasceno, Marta Maria Coelho	2018	British Journal of Nursing	Wrong intervention
Reducing pregnancy risk by motivating overweight and obese women to make preconception changes in diet and physical activity behavior: A pilot study.	Doss, Josie	2017	Reducing Pregnancy Risk by Motivating Overweight & Obese Women to Make Preconception Changes in Diet & Physical Activity Behavior: A Pilot Study	Wrong intervention

No evidence for a boost in psychosocial functioning in older age after a 6-months physical exercise intervention.	Duzel, Sandra; Drewelies, Johanna; Polk, Sarah E; Misgeld, Carola; Porst, Johanna; Wolfarth, Bernd; Kuhn, Simone; Brandmaier, Andreas M; Wenger, Elisabeth	2022	Frontiers in Human Neuroscience	Wrong intervention
The 6-month effectiveness of Internet-based guided self-help for depression in adults with Type 1 and 2 diabetes mellitus.	Ebert, D. D.; Nobis, S.; Lehr, D.; Baumeister, H.; Riper, H.; Auerbach, R. P.; Snoek, F.; Cuijpers, P.; Berking, M.	2017	Diabetic Medicine	Wrong intervention
Outcomes of a Telehealth Intervention for Homebound Older Adults With Heart or Chronic Respiratory Failure: A Randomized Controlled Trial.	Gellis, Zvi D.; Kenaley, Bonnie; McGinty, Jean; Bardelli, Ellen; Davitt, Joan; Ten Have, Thomas	2012	Gerontologist	Wrong intervention
Healthy Eating and Active Lifestyles for Diabetes (HEAL-D) programme for African and Caribbean communities: Feasibility and acceptability of a remote education programme and lessons learnt	Goff L.; White A.; White R.; Newman A.; Sampford J.; Pirie E.	2021	Diabetic Medicine	Wrong intervention
Improving glycemic control in older adults using a videophone motivational diabetes self-management intervention.	Hawkins, Shelley Y.	2010	Research & Theory for Nursing Practice	Wrong intervention

Effect of a computer-based intervention on social support for chronically ill rural women.	Hill, Wade; Schillo, Leah; Weinert, Clarann	2004	Rehabilitation nursing : the official journal of the Association of Rehabilitation Nurses	Wrong intervention
Feasibility and preliminary effects of a virtual environment for adults with type 2 diabetes: Pilot study.	Johnson, Constance; Feinglos, Mark; Pereira, Katherine; Hassell, Nancy; Blascovich, Jim; Nicollerat, Janet; Beresford, Henry F; Levy, Janet; Vorderstrasse, Allison	2014	Journal of Medical Internet Research	Wrong intervention
Participation of Female Emerging Adults in a Theory- and Evidence-Based Behavioral Weight Loss Program.	Johnson, Ping H.; Annesi, James J.	2020	International Quarterly of Community Health Education	Wrong intervention
Effects of a Digital Diabetes Prevention Program: An RCT	Katula J.A.; Dressler E.V.; Kittel C.A.; Harvin L.N.; Almeida F.A.; Wilson K.E.; Michaud T.L.; Porter G.C.; Brito F.A.; Goessl C.L.; Jasik C.B.; Sweet C.M.C.; Schwab R.; Estabrooks P.A.	2022	American Journal of Preventive Medicine	Wrong intervention

Mobile But Connected: Harnessing the Power of Self-Efficacy and Group Support for Weight Loss Success through mHealth Intervention.	Kim, Heewon; Faw, Meara; Michaelides, Andreas	2017	Journal of Health Communication	Wrong intervention
Patterns of success: online self-monitoring in a web-based behavioral weight control program.	Krukowski, Rebecca A; Harvey-Berino, Jean; Bursac, Zoran; Ashikaga, Taka; West, Delia Smith	2013	Health psychology : official journal of the Division of Health Psychology, American Psychological Association	Wrong intervention
Comparing behavioral weight loss modalities: Incremental cost-effectiveness of an Internet-based versus an in-person condition.	Krukowski, Rebecca A; Tilford, J. Mick; Harvey-Berino, Jean; West, Delia S	2011	Obesity	Wrong intervention
Benefits of adding small financial incentives or optional group meetings to a web-based statewide obesity initiative.	Leahey, Tricia M; Subak, Leslee L; Fava, Joseph; Schembri, Michael; Thomas, Graham; Xu, Xiaomeng; Krupel, Katie; Kent, Kimberly; Boguszewski, Katherine; Kumar, Rajiv; Weinberg, Brad; Wing, Rena	2015	Obesity (Silver Spring, Md.)	Wrong intervention
Older Adults and Diabetes Prevention Programs in the Veterans Health Administration.	Lee, Pearl G.; Damschroder, Laura J.; Holleman, Robert; Moin,	2018	Diabetes Care	Wrong intervention

	Tannaz; Richardson, Caroline R.			
Evaluating Real-World Adherence and Effectiveness of the "reboot Online" Program for the Management of Chronic Pain in Routine Care	Lim D.Z.; Newby J.M.; Gardner T.; Haskelberg H.; Schultz R.; Faux S.G.; Shiner C.T.	2021	Pain Medicine (United States)	Wrong intervention
Feasibility and effectiveness of a web-based physical activity intervention for working mothers.	Mailey, Emily L; Huberty, Jennifer; Irwin, Brandon C	2016	Journal of Physical Activity & Health	Wrong intervention
Development of a Pilot Telehealth Bariatric Surgery Support Group.	Schofield, Carin K	2013	Development of a Pilot Telehealth Bariatric Surgery Support Group	Wrong intervention
Enhancing diabetes care through care coordination, telemedicine, and education: Evaluation of a rural pilot program.	McLendon, Susan F; Wood, Felecia G; Stanley, Nancy	2019	Public Health Nursing	Wrong intervention
Testing the short-term effectiveness of primary care referral to online weight loss programmes: A randomised controlled trial.	Noreik, Michaela; Madigan, Claire D; Astbury, Nerys M; Edwards, Rhiannon M; Galal, Ushma; Mollison, Jill; Ghebretinsea, Fitsum; Jebb, Susan A	2021	Clinical obesity	Wrong intervention
Patient engagement and presence in a virtual world world diabetes self-management education intervention for minority women	Mitchell S.; Bragg A.; Gardiner P.; De La Cruz B.; Laird L.	2021	Patient Education and Counseling	Wrong intervention

Long-term outcomes of internet-based self-management support in adults with asthma: randomized controlled trial.	van Gaalen, Johanna L; Beerthuizen, Thijs; van der Meer, Victor; van Reisen, Patricia; Redelijkheid, Geertje W; Snoeck-Stroband, Jiska B; Sont, Jacob K; SMASHING Study Group	2013	Journal of medical Internet research	Wrong intervention
The chronic illness experience of isolated rural women: Use of an online support group intervention.	Winters, Charlene A; Sullivan, Therese	2006	Rural nursing: Concepts, theory, and practice., 2nd ed.	Wrong intervention
A Telehealth-supported, Integrated care with CHWs, and MEdication-access (TIME) Program for Diabetes Improves HbA1c: a Randomized Clinical Trial.	Vaughan, Elizabeth M; Hyman, David J; Naik, Aanand D; Samson, Susan L; Razjouyan, Javad; Foreyt, John P	2021	Journal of general internal medicine	Wrong intervention
Adding Financial Incentives to Online Group-Based Behavioral Weight Control: An RCT.	West, Delia S; Krukowski, Rebecca A; Finkelstein, Eric A; Stansbury, Melissa L; Ogden, Doris E; Monroe, Courtney M; Carpenter, Chelsea A; Naud, Shelly; Harvey, Jean R	2020	American journal of preventive medicine	Wrong intervention

A Pilot Study Evaluating the Effects of a Technology-Based and Positive Psychological Training Intervention on Blood Pressure in African Americans With Hypertension.	Still, Carolyn H.; Margevicius, Seunghee P.; Wright Jr., Jackson T.; Ruksakulpiwat, Suebarn; Moore, Shirley M.	2021	Journal of Primary Care & Community Health	Wrong intervention
Integrated Social- and Neurocognitive Model of Physical Activity Behavior in Older Adults with Metabolic Disease.	Olson, Erin; Mullen, Sean; Raine, Lauren; Kramer, Arthur; Hillman, Charles; McAuley, Edward; Olson, Erin A; Mullen, Sean P; Raine, Lauren B; Kramer, Arthur F; Hillman, Charles H	2017	Annals of Behavioral Medicine	Wrong intervention
A qualitative participatory study to identify experiences of coronary heart disease patients to support the development of online self-management services	Vosbergen S.; Janzen J.; Stappers P.J.; van Zwieten M.C.B.; Lacroix J.; Idema K.; van den Broek I.; Kemps H.M.C.; Kraaijenhagen R.A.; Peek N.	2013	International Journal of Medical Informatics	Wrong intervention
Effectiveness of a web-based tailored interactive health communication application for patients with type 2 diabetes or chronic low back pain: randomized controlled trial.	Weymann, Nina; Dirmaier, JÃ¶rg; von Wolff, Alessa; Kriston, Levente; HÃ¤rter, Martin	2015	Journal of Medical Internet Research	Wrong intervention
A systematic diagnostic evaluation combined with an internet-based support system for asthma/COPD	Van Buul A.R.; Wildschut T.S.; Bonten T.N.;	2019	European Respiratory Journal	Wrong intervention

	Kasteleyn M.J.; Slats A.M.; Chavannes N.H.; Taube C.			
Web-based intervention to promote weight-loss maintenance using an activity monitor: A randomized controlled trial	Nakata Y.; Sasai H.; Tsujimoto T.; Hashimoto K.; Kobayashi H.	2019	Preventive Medicine Reports	Wrong intervention
Cooking Education Improves Cooking Confidence and Dietary Habits in Veterans.	Dexter, Ashley S; Pope, Janet F; Erickson, Dawn; Fontenot, Catherine; Ollendike, Elizabeth; Walker, Emily	2019	The Diabetes educator	Wrong intervention
An Internet-based diabetes self-care intervention tailored to self-efficacy.	Wangberg SC	2008	Health Education Research	Wrong intervention
Online Self-Tracking Groups to Increase Fruit and Vegetable Intake: A Small-Scale Study on Mechanisms of Group Effect on Behavior Change.	Meng, Jingbo; Peng, Wei; Shin, Soo Yun; Chung, Minwoong	2017	Journal of medical Internet research	Wrong intervention
Favorable Outcomes Using an eHealth Approach to Promote Physical Activity and Nutrition Among Young African American Women.	Staffileno, Beth A.; Tangney, Christy C.; Fogg, Louis	2018	Journal of Cardiovascular Nursing	Wrong intervention
Engagement and Weight Loss: Results from the Mobile Health and Diabetes Trial.	Muralidharan, Shruti; Ranjani, Harish; Mohan Anjana, Ranjit; Jena, Sidhant; Tandon, Nikhil; Gupta, Yashdeep; Ambekar, Samita; Koppikar, Varsha;	2019	Diabetes Technology & Therapeutics	Wrong intervention

	Jagannathan, N; Allender, Steven; Mohan, Viswanathan			
Effectiveness of online and face-to-face fatigue self-management programmes for adults with neurological conditions.	Ghahari, Setareh; Packer, Tanya	2012	Disability and Rehabilitation: An International, Multidisciplinary Journal	Wrong intervention
Interactive sections of an Internet-based intervention increase empowerment of chronic back pain patients: randomized controlled trial.	Riva, Silvia; Camerini, Anne-Linda; Allam, Ahmed; Schulz, Peter J	2014	Journal of Medical Internet Research	Wrong intervention
Effectiveness of a Web-Based Computer-Tailored Multiple-Lifestyle Intervention for People Interested in Reducing their Cardiovascular Risk: A Randomized Controlled Trial.	Storm, Vera; DÃ¶renkÃ¤mper, Julia; Reinwand, Dominique Alexandra; Wienert, Julian; Vries, Hein De; Lippke1, Sonia	2016	Journal of Medical Internet Research	Wrong intervention
The utilization of video-conference shared medical appointments in rural diabetes care	Tokuda L.; Lorenzo L.; Theriault A.; Taveira T.H.; Marquis L.; Head H.; Edelman D.; Kirsh S.R.; Aron D.C.; Wu W.-C.	2016	International Journal of Medical Informatics	Wrong intervention

Exploring the role of telehealth: A novel approach to group-based smoking cessation treatment for men incarcerated in a rural state prison	Valera P.; Malarkey S.; Smith N.; McLaughlin C.	2021	Journal of telemedicine and telecare	Wrong intervention
Effectiveness of an online self-management tool, OPERAS (an On-demand Program to EmpoweR Active Self-management), for people with rheumatoid arthritis: A research protocol	Tam J.; Lacaille D.; Liu-Ambrose T.; Shaw C.; Xie H.; Backman C.L.; Esdaile J.M.; Miller K.; Petrella R.; Li L.C.	2019	Trials	Wrong intervention
RAHelp: an online intervention for individuals with rheumatoid arthritis.	Shigaki, Cheryl L; Smarr, Karen L; Siva, Chokkalingam; Ge, Bin; Musser, Dale; Johnson, Rebecca	2013	Arthritis care & research	Wrong intervention
A video-game group intervention: Experiences and perceptions of adults with chronic stroke and their therapists: Intervention de groupe a l'aide de jeux video : Experiences et perceptions d'adultes en phase chronique d'un accident vasculaire cerebral et d	Rand, Debbie; Givon, Noa; Avrech Bar, Michal	2018	Canadian journal of occupational therapy. Revue canadienne d'ergotherapie	Wrong intervention
Randomized controlled trial of financial incentives during weight-loss induction and maintenance in online group weight control	West D.S.; Krukowski R.A.; Monroe C.M.; Stansbury M.L.; Carpenter C.A.; Finkelstein E.A.; Naud S.; Ogden D.; Harvey J.R.	2022	Obesity	Wrong intervention

Perspectives on a Home Telehealth Care Management Program for Veterans With Posttraumatic Stress Disorder Who Smoke.	Peterson, Jamie; Battaglia, Catherine; Fehling, Kelty B.; Williams, Katherine M.; Lambert-Kerzner, Anne	2017	Journal of Addictions Nursing	Wrong intervention
Acceptance of Tele-Rehabilitation by Stroke Patients: Perceived Barriers and Facilitators.	Tyagi, Shilpa; Lim, Daniel S.Y.; Ho, Wilbert H.H.; Koh, Yun Qing; Cai, Vincent; Koh, Gerald C.H.; Legido-Quigley, Helena	2018	Archives of Physical Medicine & Rehabilitation	Wrong intervention
Effect of a web-based behavior change program on weight loss and cardiovascular risk factors in overweight and obese adults at high risk of developing cardiovascular disease: Randomized controlled trial.	Watson, Sinead; Woodside, Jayne V; Ware, Lisa J; Hunter, Steven J; McGrath, Alanna; Cardwell, Christopher R; Appleton, Katherine M; Young, Ian S; McKinley, Michelle C	2015	Journal of Medical Internet Research	Wrong intervention
Results From a Trial of an Online Diabetes Prevention Program Intervention	Moin T.; Damschroder L.J.; AuYoung M.; Maciejewski M.L.; Havens K.; Ertl K.; Vasti E.; Weinreb J.E.; Steinle N.I.; Billington C.J.; Hughes M.; Makki F.; Youles B.; Holleman R.G.; Kim H.M.; Kinsinger L.S.; Richardson C.R.	2018	American Journal of Preventive Medicine	Wrong intervention

Effect of An Online Physical Activity Promotion Program and Cardiovascular Symptoms Among Asian American Women at Midlife.	Chee, Wonshik; Kim, Sangmi; Tsai, Hsiu-Min; Liu, Jianghong; Im, Eun-Ok	2021	CIN: Computers, Informatics, Nursing	Wrong intervention
Short-term and long-term effect of a high-intensity pulmonary rehabilitation programme in obese patients with asthma: A randomised controlled trial	Turk Y.; Theel W.; Van Huisstede A.; Van De Geijn G.J.M.; Birnie E.; Hiemstra P.S.; Sont J.K.; Taube C.; Braunstahl G.-J.	2020	European Respiratory Journal	Wrong intervention
A telehealth program for self-management of COPD exacerbations and promotion of an active lifestyle: A pilot randomized controlled trial	Tabak M.; Brusse-Keizer M.; van der Valk P.; Hermens H.; Vollenbroek-Hutten M.	2014	International Journal of COPD	Wrong intervention
A randomized comparison of two motivationally enhanced Internet behavioral weight loss programs	Webber K.H.; Tate D.F.; Michael Bowling J.	2008	Behaviour Research and Therapy	Wrong intervention
Motivational interviewing in internet groups: a pilot study for weight loss.	Webber, Kelly H; Tate, Deborah F; Quintiliani, Lisa M	2008	Journal of the American Dietetic Association	Wrong intervention
Randomised-controlled trial of a web-based dietary intervention for patients with type 2 diabetes: changes in health cognitions and glycemic control.	Ramadas, Amutha; Chan, Carina Ka Yee; Oldenburg, Brian; Hussein, Zanariah; Quek, Kia Fatt	2018	BMC Public Health	Wrong intervention
Randomized controlled trial of Web-based weight-loss intervention with human support for male workers under 40.	Ozaki, Itsuko; Watai, Izumi; Nishijima, Mariko; Saito, Nozomu	2019	Journal of occupational health	Wrong intervention

A nutritional web-based approach in obesity and diabetes before and during COVID-19 lockdown	Fraticelli F.; Nicola M.D.; Vitacolonna E.	2020	Journal of telemedicine and telecare	Wrong intervention
The Effective Management of Idiopathic Intracranial Hypertension Delivered by In-person and Virtual Group Consultations: Results and Reflections from a Phase One Service Delivery	Wong S.H.; Barrow N.; Hall K.; Gandesha P.; Manson A.	2021	Neuro-Ophthalmology	Wrong intervention
Randomized trial comparing group size of periodic in-person sessions in a remotely delivered weight loss intervention.	Tate, Deborah F; Valle, Carmina G; Crane, Melissa M; Nezami, Brooke T; Samuel-Hodge, Carmen D; Hatley, Karen E; Diamond, Molly; Polzien, Kristen	2017	The international journal of behavioral nutrition and physical activity	Wrong intervention
Longitudinal analysis of virtual community perceptions of cohesion: The role of cooperation, communication, and competition.	Lyles, Annmarie A; Loomis, Colleen; Mama, Scherezade K; Siddiqi, Sameer; Lee, Rebecca E	2018	Journal of health psychology	Wrong intervention
Feasibility and effect of in-home physical exercise training delivered via telehealth before bariatric surgery.	Baillot, AurÃ©lie; Boissy, Patrick; Tousignant, Michel; Langlois, Marie-France	2017	Journal of Telemedicine & Telecare	Wrong intervention
A pilot test of the GoWoman weight management intervention for women with mobility impairments in the online virtual world of Second Life	Nosek M.A.; Robinson-Whelen S.; Ledoux T.A.; Hughes R.B.; O'Connor D.P.; Lee R.E.; Goe R.; Silveira S.L.; Markley R.; Nosek T.M.	2019	Disability and rehabilitation	Wrong intervention

Internet-based self-management plus education compared with usual care in asthma: a randomized trial.	van der Meer, Victor; Bakker, Moira J; van den Hout, Wilbert B; Rabe, Klaus F; Sterk, Peter J; Kievit, Job; Assendelft, Willem J J; Sont, Jacob K; SMASHING (Self-Management in Asthma Supported by Hospitals, ICT, Nurses and General Practitioners) Study Group	2009	Annals of internal medicine	Wrong intervention
Evaluation of a Digital Diabetes Prevention Program Adapted for Low-Income Patients, 2016-2018.	Kim, Sue E.; Castro Sweet, Cynthia M.; Cho, Edward; Tsai, Jennifer; Cousineau, Michael R.	2019	Preventing Chronic Disease	Wrong intervention
Feasibility, acceptability, and impact of a web-based structured education program for type 2 diabetes: Real-world study	Poduval S.; Marston L.; Hamilton F.; Stevenson F.; Murray E.	2020	JMIR Diabetes	Wrong intervention
Latent user groups of an eHealth physical activity behaviour change intervention for people interested in reducing their cardiovascular risk.	Wienert, Julian; Kuhlmann, Tim; Storm, Vera; Reinwand, Dominique; Lippke, Sonia	2019	Research in Sports Medicine	Wrong intervention
Cost-effectiveness of Shared Telemedicine Appointments in Young Adults With T1D: CoYoT1 Trial.	Wan, Wen; Nathan, Aviva G; Skandari, M Reza; Zarei, Parmida; Reid, Mark W; Raymond, Jennifer K; Huang, Elbert S	2019	Diabetes care	Wrong outcomes

Motivators and barriers to exercise among adults with a high risk of type 2 diabetes--a qualitative study.	Korkiakangas, Eveliina E; Alahuhta, Maija A; Husman, Paivi M; Keinanen-Kiukaanniemi, Sirkka; Taanila, Anja M; Laitinen, Jaana H	2011	Scandinavian journal of caring sciences	Wrong outcomes
The healing hearts together randomized controlled trial and the COVID-19 pandemic: A tutorial for transitioning from an in-person to a web-based intervention	Lalande K.; Greenman P.S.; Bouchard K.; Johnson S.M.; Tulloch H.	2021	Journal of Medical Internet Research	Wrong outcomes
Shared telemedicine appointments in young adults with T1D-an economic evaluation of the coyot1 trial	Wan W.; Skandari R.; Nathan A.; Zarei P.; Reid M.W.; Raymond J.; Huang E.	2018	Diabetes	Wrong outcomes
Effects of supervised exercise-based tele-rehabilitation group (settle) program on physical fitness and health related quality of life in patients with chronic disease in India in covid-19	Patel J.; Pujary D.; Kaur G.; Deodhar A.; Kharbanda S.; Zende A.; Contractor A.	2020	Journal of Cardiopulmonary Rehabilitation and Prevention	Wrong outcomes
Overcoming the Digital Divide in the Post-COVID-19 "Reset": Enhancing Group Virtual Visits with Community Health Workers.	Shah, Megha K; Gibbs, Ashley Christina; Ali, Mohammed K; Narayan, K M Venkat; Islam, Nadia	2021	Journal of medical Internet research	Wrong outcomes

A pilot randomized controlled trial for a videoconference-delivered mindfulness-based group intervention in a nonclinical setting.	Krageloh, Christian U; Medvedev, Oleg N; Taylor, Tamasin; Wrapson, Wendy; Rix, Grant; Sumich, Alexander; Wang, Grace Y; Csako, Rita; Anstiss, David; Ranta, Jussi T; Patel, Ninad; Siegert, Richard J	2019	Mindfulness	Wrong patient population
Mind-body therapy via videoconferencing in patients with neurofibromatosis: An RCT.	Vranceanu, Ana-Maria; Riklin, Eric; Merker, Vanessa L; Macklin, Eric A; Park, Elyse R; Plotkin, Scott R	2016	Neurology	Wrong patient population
Transition Education for Young Adults With Type 1 Diabetes: Pilot Feasibility Study for a Group Telehealth Intervention.	Albanese-O'Neill, Anastasia; Beauchamp, Giovanna; Thomas, Nicole; Westen, Sarah C; Johnson, Nicole; Schatz, Desmond; Haller, Michael J	2018	JMIR diabetes	Wrong patient population
Acceptability and Feasibility of a Mindfulness Intervention Delivered via Videoconferencing for People With Parkinson's	Bogosian A.; Hurt C.S.; Hindle J.V.; McCracken L.M.; Vasconcelos e Sa D.A.; Axell S.; Tapper K.; Stevens J.; Hirani P.S.; Salhab M.; Ye W.; Cubi-Molla P.	2022	Journal of Geriatric Psychiatry and Neurology	Wrong patient population

A 1-year videoconferencing-based psychoeducational group intervention following bariatric surgery: results of a randomized controlled study.	Wild, Beate; Hunnemeyer, Katharina; Sauer, Helene; Hain, Bernhard; Mack, Isabelle; Schellberg, Dieter; Muller-Stich, Beat Peter; Weiner, Rudolf; Meile, Tobias; Rudofsky, Gottfried; Konigsrainer, Alfred; Zipfel, Stephan; Herzog, Wolfgang; Teufel, Martin	2015	Surgery for obesity and related diseases : official journal of the American Society for Bariatric Surgery	Wrong setting
PARIS: Protocol for a prospective single arm, theory-based, group-based feasibility intervention study to increase Physical Activity and reduce sedentary behaviouR after barIatric Surgery	James J.; Hardeman W.; Eborall H.; Goodall M.; Wilding J.	2021	BMJ Open	Wrong setting
Adapting home telehealth group appointment model (CoYoT1 clinic) for a low SES, publicly insured, minority young adult population with type 1 diabetes.	Raymond, Jennifer K; Reid, Mark W; Fox, Steven; Garcia, Jaquelin Flores; Miller, Debbie; Bisno, Daniel; Fogel, Jennifer L; Krishnan, Subramanian; Pyatak, Elizabeth A	2020	Contemporary clinical trials	Wrong study design
Use of health-related online support groups: Population data from the California health interview survey complementary and alternative medicine study.	Owen, Jason E; Boxley, Laura; Goldstein, Michael S; Lee, Jennifer H; Breen, Nancy; Rowland, Julia H	2010	Journal of Computer-Mediated Communication	Wrong study design

Applying the COM-B model to creation of an IT-enabled health coaching and resource linkage program for low-income Latina moms with recent gestational diabetes: the STAR MAMA program.	Handley, Margaret A.; Harleman, Elizabeth; Gonzalez-Mendez, Enrique; Stotland, Naomi E.; Althavale, Priyanka; Fisher, Lawrence; Martinez, Diana; Ko, Jocelyn; Sausjord, Isabel; Rios, Christina	2016	Implementation Science	Wrong study design
Tele-yoga in long term illness-protocol for a randomised controlled trial including a process evaluation and results from a pilot study	Stromberg A.; Thylen I.; Orwelius L.; Klompstra L.; Jaarsma T.	2021	International Journal of Environmental Research and Public Health	Wrong study design

Appendix 10: Participant and facilitator recruitment poster

Virtual group programmes in healthcare:

Want to share your experiences?

Have you participated in, or facilitated, a virtual group programme in healthcare, such as the virtual **NHS Diabetes Prevention Programme?**
You could be interviewed on your experiences of taking part, to help shape the future of these programmes.

More info: contact Charlotte on c.reburn@exeter.ac.uk

University of Exeter

Version 1.0, 19.05.2023

IRAS ID: 325953

Appendix 11: Emails and texts to advertise the study

Email to send to advertise the study via company

We want to hear from you!

Do you want to shape how virtual programmes like the NHS Diabetes Prevention Programme are delivered in the future?

What's happening?

Researchers from the University of Exeter are exploring what it's like to take part in virtual programmes, and how they can be improved in the future.

How can I take part?

You can take part in an online interview with a researcher from the project, lasting about an hour. You'll talk to them about your experiences of taking part in the NHS Diabetes Prevention Tailored Remote programme.

Your feedback will directly guide recommendations for the future of these programmes, and will improve the experiences of future service users.

You'll receive a small token of thanks for your time.

I'm interested! What now?

Contact Charlotte Reburn, lead researcher, on c.reburn@exeter.ac.uk

Text to advertise the study via company

Want to share your experiences of the NDPP? We'd love to hear from you. Take part in an interview and shape future programmes. Find out more here.

Appendix 12: Participant information leaflet

Exploring experiences of virtual group interventions

What do I need to know?

Information guide for participants

University of Exeter

Version 1.0
19.05.2023

The study in a nutshell

What is this study about?

This study focuses on understanding what it's like to facilitate and take part in **virtual group programmes** for improving health. These are video-based programmes, like the NHS Diabetes Prevention Programme (NDPP).

What are the study's aims?

1) To interview facilitators and participants of virtual group programmes such as the NDPP, to **understand their experiences**
2) To explore what **changes** could be made to programmes to improve them in the future

Where do you fit in?

You can take part in this study because you are:

1) Aged over **18** years
2) A **facilitator** of OR a **participant** in a virtually-delivered health programme

What participating involves

What you'll do

You will take part in an **hour-long interview** with a researcher from the study team. Interviews will be **one-to-one**, over video conferencing or a voice-only call. You'll be asked about your thoughts on facilitating/taking part in a virtual programme such as the NDPP.

Benefits

You will have the chance to shape recommendations for future versions of virtual group programmes.

You will receive a token of thanks for your time.

Risks

Risks of taking part are minimal.

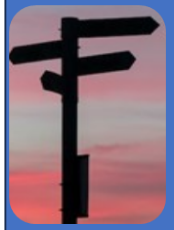
There are **no sensitive questions**, but our team will be here to help you if you become emotional when describing your experiences.

Background

Who are we, and why are we conducting this study?

Charlotte Reburn is a PhD student at the University of Exeter, and her PhD looks at **understanding benefits and drawbacks** of video-based group programmes in healthcare.

What will this study produce?



This study will help create **recommendations** on how to improve these programmes. We will produce a **final report**, as well as a **short summary**.

Why is this study important?

These types of programmes are quite new, so understanding your experiences will give us an **insight** into what it's like to take part, as well as how they can improve.

Next steps

Express your interest

By emailing c.reburn@exeter.ac.uk

Giving your consent to take part in this study

By completing our consent form that we will send you

Your interview

1-hour long, at a time convenient for you

Your data

Will be stored securely in compliance with GDPR

Withdrawing from the study

You can withdraw at any time

Finishing the study

We'll send you a copy of the final report and a short summary

Contact information

Got a query, question or concern?

Email Charlotte Reburn, the lead researcher for this study, on c.reburn@exeter.ac.uk

IRAS ID: 325953

Appendix 13: Ethics timeline

Timeline for granting of ethical approval: Understanding virtual group interventions

Date	Description
Nov 2022	I was told I needed University of Exeter ethics. Booked a slot for December 2022.
Dec 2022	I was told in a University of Exeter Ethics advice clinic that I needed HRA ethics, and to cancel my University ethics slot.
Dec 2022	I postponed my University of Exeter Ethics slot from January to March 2023 – this was on the advice of my supervisors.
Dec 2022	I emailed the University of Exeter's Research Governance Manager (RGM), on the recommendation of the advice clinic, asking whether she thought I needed to obtain NHS ethics.
Dec 2022	Had a meeting with RGM, who told me that I need to go through the NHS ethics process.
Jan 2023	Registered my project with IRAS, to begin the application process.
Feb 2023	RGM informed me that another individual from the team would now be helping me with my ethics application.
Feb 2023	I asked this individual for some help with the IRAS form, which she gave.
Mar 2023	This individual suggests that I should get the company delivering the NHS DPP, through which I'm going to be advertising my study, to sign a PIC agreement.
Mar 2023	I cancel my University of Exeter Ethics meeting slot for March.
Mar 2023	This individual suggests that a PIC agreement would be "overkill", so suggests that I don't complete one.
04/04/2023	My application is now complete (to my knowledge) and I'm ready to submit with RGM's sponsor authorisation.
04/04/2023	I ask the ethics team at the University whether anyone else can sign off my application for submission, and they inform me that it needs to be RGM.
04/04/2023	I ask RGM for her Sponsor approval, no reply.
27/04/2023	I ask RGM for a timeline on when I can expect her sponsor approval.

03/05/2023	I have to cancel a meeting with the company delivering the NHS DPP, because there has been no response from RGM, so no progress has been made.
10/05/2023	I ask RGM for her approval for a third time.
10/05/2023	RGM gets back to me apologising for the delay, saying my project “dropped through a hole”. She is keen to meet up and is very helpful in a meeting we have to discuss my project.
10/05/2023	I send RGM the final amendments and documents ready for the form to be approved.
19/05/2023	RGM gets back to me with final corrections, and arranges a meeting to submit my IRAS application.
22/05/2023	Meeting happens, but lasts five minutes because of an error in the form.
22/05/2023	I believe the error to be fixed, and ask RGM when she can next meet to submit the form – no reply.
23/05/2023	I ask RGM if it would be okay for me to submit the form without having a meeting with her – no reply.
23/05/2023	I try and submit the form, but the error is still present. I can’t submit.
24/05/2023	I ask RGM for advice on this error that is not letting me submit – no reply.
26/05/2023	I ask the IRAS advice team for support on this matter.
29/05/2023	The IRAS team get back to me questioning if I need NHS ethics at all. I reply with project details.
12/06/2023	The IRAS team respond saying that the project requires NHS REC review, rather than full HRA and HCRW approval.
13/06/2023	Ethics application is submitted for review on the 26th of June.
26/06/2023	Application is reviewed by the NHS REC.
27/06/2023	Ethical approval is granted with no changes required.

Appendix 14: Participant Information Sheet

St Luke's Campus,
University of Exeter,
Exeter, EX1 2LU

https://www.exeter.ac.uk/

Participant Information Sheet

Study title: Exploring experiences of participants of virtual group interventions for the prevention of chronic physical conditions and promotion of health.

Short title: Understanding Experiences of Virtual Group Interventions

Invitation paragraph

We'd like to invite you to take part in our research study. Before you make a decision on taking part, it's important that you understand what taking part would involve, and why this research is being done. Please read the following information, and discuss with others if you need to. If you'd like any more information, please contact us.

1. **Brief summary**

Virtual group interventions (or virtual group programmes), as defined by this study, are programmes which:

- Contain three or more participants and a trained facilitator
- Take place over real-time videoconferencing software (such as Zoom)
- Focus on preventing or managing a chronic physical condition, like type 2 diabetes
- Take place over a series of regular sessions, such as weekly or monthly meetings

These programmes have been used more in healthcare settings over the last few years, particularly because of the Covid-19 pandemic, which caused many existing programmes to be delivered virtually. It's important to understand what it's like to take part in, or lead, one of these programmes. Understanding this will give us a better idea of what needs to be done to improve virtual group programmes in the future and improve outcomes for participants and facilitators.

This study involves taking part in an hour-long interview exploring your experiences of taking part in a virtual group programme in healthcare, such as the virtually-delivered National Diabetes Prevention Programme. This aims to further understand the experiences of participants in these programmes, and to explore what changes could be made to programmes to improve them in the future.

2. Why have you been invited to take part?

We are looking to interview people who have either:

- Participated in some sessions of a virtual group programme in healthcare, for instance the NHS Diabetes Prevention Programme
- Facilitated some sessions of a virtual group programme in healthcare, such as the NHS Diabetes Prevention Programme

3. What's involved?

You will take part in an hour-long interview with a researcher from the study team. Interviews will be one-to-one, at a time that is convenient for you. They will take place over video conferencing or a voice-only call, depending on your preference.

You'll be asked about your thoughts on taking part in a virtual programme such as the virtual NDPP. Questions will ask about your opinions on the benefits of these programmes, the drawbacks of these programmes, how these

programmes work to change behaviours, and things that could be changed in future versions of these programmes, to improve the experience for future participants.

At the start of the interview, you will be asked for your consent for the audio of your interview to be recorded, so that we can write down your responses accurately. At the end of the interview, the interviewer will ask you basic questions about your age, gender, and where you live (urban/suburban/rural). Your answers to these questions will help us with data analysis, and will not be shared with a third party.

4. How do I consent to take part in this study?

If you would like to express your interest in taking part in this study, please email Charlotte Reburn on the email address below. Once you have emailed to express your interest, you will be sent a consent form. This consent form explains what you should expect to happen as a participant in this study, and explains what you are consenting to as a participant in this study. You fill this in online and a copy will be sent to the study team.

5. How will my information be stored?

Personal, identifiable data will include your name and contact details, as well as your name and signature on the consent form. This personal data will be stored securely on an encrypted password protected computer, which can only be accessed by the research team. Any personally identifiable information about you (e.g., your name) will be stored separately and securely from information obtained from the research (e.g., the results of this study), it will only be kept for a limited time (3 months) and securely destroyed. This excludes consent forms, which will be held by the University of Exeter for 7 years after the end of the study.

Deidentified research data (e.g., the transcript from your interview) will be made anonymous by removing any personal data from it. Every participant will be given a unique participant ID number, so that your name does not appear on

any research documents, such as the final report. The basic information that we'll collect at the end of your interview (e.g., your age and gender) will be stored with your participant ID number, rather you're your name.

We will record the audio of your interview, and the recording will be labelled with the participant ID and a researcher will write down what was said. The audio recording of your interview will be deleted at the end of the study. The transcript of your interview will be labelled with your participant ID and any personal information (e.g. names or places mentioned) will be removed. Deidentified transcripts, along with deidentified participants' characteristics, will be stored securely on the University of Exeter's IT network for 7 years after the end of the study.

In 2018 regulatory changes in the way that data is processed came into force, with the EU General Data Protection Regulation 2018 (GDPR) and the Data Protection Act 2018 (DPA 2018). Since the UK left the EU, the key principles of EU GDPR have been adopted in the UK GDPR (a 'UK-only' version) and the DPA 2018 still applies.

The University of Exeter terms its lawful basis to process personal data for the purposes of carrying out research as being in the 'public interest'. The University continues to be transparent about its processing of your personal data and the participant information sheet should provide a clear explanation of how your data will be collected, processed, stored and destroyed. If you have any queries about the University's processing of your personal data that cannot be resolved by the research team, further information can be obtained from the University of Exeter's Data Protection Officer via the web-link; https://www.exeter.ac.uk/aboutoursite/dataprotection/dpo/

If you have any concerns about how your data is controlled and managed for this study, then please contact the Sponsor Representative: Research Governance Manager (Contact details at the end of the information sheet).

6. What are the possible benefits of taking part?

There is no direct benefit to you from taking part in this study, but you will have the opportunity to share your experiences and shape recommendations for future virtual group programmes. This will help to maximise the benefits of participating in these types of programmes in the future.

7. What are the possible disadvantages and risks of taking part?

Risks of taking part in this study are minimal.

There are no sensitive questions, and there are no topics that are expected to cause distress. However, with all interviews, there is a very small risk of becoming emotional as you recall your experiences. If this happens, the research team will be here to help you through this process, and you can end your interview at any time.

There will be no changes to your clinical care if you participate (or choose not to participate) in the study.

8. Will I be paid for taking part?

After taking part in your interview, you will be offered a £25 voucher as a token of thanks for your time.

9. What if something goes wrong?

If something happens during your interview that means the interview must be terminated, you can decide to re-arrange the interview, in order to finish the course of the questions, at a time that is convenient for you. Alternatively, you can tell us that you do not want to rearrange, and you can indicate that the recording of the interview that has been taken can be used in data analysis.

10. What will happen if I don't want to carry on with the study?

If you do not want to carry on with the study, you can email the study team at any point before your interview to withdraw from the study, without giving any reasons. Your personal data will then be removed from the study's storage.

11. What will happen to the results of this study?

The results of this study will be used to generate some recommendations for future virtual group programmes, in order to improve the experience of future participants. These results will be displayed in a final report, as well as in a short summary of the research. Both the final report and the short summary will be circulated to participants as soon as they have been produced.

12. Who is organising and funding this study?

This study is funded by the National Institute for Health Research's School for Primary Care Research (NIHR SPCR). The NIHR SPCR is funding the PhD project of which this study forms a part.

13. How have patients and the public been involved in this study?

A public involvement group (consisting of a diverse group of members of the public) were consulted at the start of the study to establish the relevance of this study to participants, the conciseness and clarity of the research questions, and the appropriateness of the questions that will be asked in the interview.

After the interviews, a public involvement group will be consulted to determine the clarity of the results, and the applicability of the message to healthcare participants.

14. Further information and contact details

For more information, please contact **Charlotte Reburn**, the lead researcher on this study, at c.reburn@exeter.ac.uk.

Sponsor Representative: Research Governance Manager (Health & Social Care), University of Exeter, Research Ethics and Governance Office, Lafrowda House, St Germans Road, Exeter EX4 6TL. Tel: 01392 723588, email: (redacted)

Version number: 1.0, 19.05.2023

Appendix 15: Consent form

CONSENT FORM (Will be completed online)

Title of Project: Understanding experiences of virtual group interventions

Name of Researcher: Charlotte Reburn

Participant ID:

Please answer yes or no to each statement in the boxes below.

1	I confirm that I have read the information sheet dated 10.05.2023 (version 1) for the above study. I have had the opportunity to consider the information, ask questions, and have had these answered satisfactorily.	
2	I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.	
3	I understand that the research data collected by the study may be seen by designated individuals at the University of Exeter or regulatory authorities for monitoring, and I give these individuals permission to access my data where it is relevant to taking part in this research.	
4	I agree for the interview to be audio recorded.	
5	I understand that anonymised quotations will be used in the report of this research.	
6	I understand how my data will be stored and what will happen to the data at the end of the study.	
7	I agree to take part in the above study.	

Name of Participant	Date	Signature
Name of Person seeking consent	Date	Signature

If you'd like any more information, please email Charlotte on c.reburn@exeter.ac.uk.

Appendix 16: Participant interview topic guide

St Luke's Campus

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Interview topic guide (participants of interventions)

This interview guide is not a script, it doesn't have to be followed strictly. The aim of each section illustrates what the questions within a section aim to cover

Research objectives

To further understand the experiences of participants of virtual group interventions for preventing and managing chronic physical conditions

Introduction

Aim: to ensure that participants are relaxed and informed about the purpose and structure of the interviews

- Thank you, consent forms, how the interview is going to go and why I'm doing it, no right or wrong answers, confidentiality, any questions? Start recorder
- Verbal confirmation of consent

Icebreaker

Aim: to relax participants with an easy question to start the interview and make the participants feel at ease

- Have you ever taken part in any programmes that were similar to this?
- [If they answer yes, ask the following:] How does that programme compare to this programme?
- [If they answer no, move on to **Focus 1**]

Focus 1 – Choosing virtual group programmes

Aim: to understand the context in which the participant came to participate in the programme of interest

- How did you find out about this programme?
- Why did you choose to participate in this programme?
- Was there anything in particular that influenced your decision to choose this mode of access?

Focus 2 – Barriers and facilitators to participating in virtual group interventions

Aim: to understand how easy/difficult it was for participants to access these interventions, and what factors acted as facilitators or barriers to accessing these interventions, considering aspects including technological and logistical factors, and any changes they had to make to their lives to access the intervention

- Was there anything that helped you to access the programme when you first enrolled on the programme?
- Were there any factors that made accessing the programme more difficult for you?
- Did you have to make any changes in your life in order to access the intervention?
    - For instance, did you have to buy new equipment, or learn any more skills?
- Was there anything that could have been changed to make accessing the programme easier for you?

PROMPTS: including –

- Any previous experience in using technology in general/this kind of technology, using the devices needed
- Any issues with fitting it in with daily life
- Any assistance given to increase access/lack of assistance
- What kind of person do you think would find this programme easy/hard to access?

Focus 3 – Benefits and drawbacks of virtual group interventions

Aim: to understand the perceived benefits and drawbacks of being a participant in a virtual group intervention

- Did you find anything worked particularly well about this intervention?

PROMPT: Perhaps there's something about this intervention was particularly useful, compared to other types of intervention?

Male and female facilitator and what worked well about them/what didn't work well

- Is there anything that you think didn't work so well about this intervention?

PROMPT: Is there anything that could have been improved to make the intervention better next time?

Focus 4 – Perceived effects and mechanisms of action

Aim: to understand how participants perceived the effectiveness of the intervention and what mechanisms may have influenced this effectiveness

- Can you comment on whether you've noticed any changes in yourself after having taken part in this intervention?
- Did you feel like the intervention changed your behaviour in any way?
- [If yes, ask the following:] Can you think of anything related to the intervention that may have played a part in this behaviour change? Was there anything in the intervention that might have been partially responsible for changing your behaviour?
- [If no, move onto **focus 4**]

Focus 5 – Further thoughts and wrap-up

Aim: to obtain any further comments and thoughts from the participants that haven't been covered by the interview

- Do you have any further comments about the programme that you think might be useful to bring up, that we haven't yet covered?

Focus 6 – Basic information questionnaire

Aim: To obtain basic demographic information from the interview participant, to help with data analysis.

1. What is your age in years?
    a. 18-24
    b. 25-34
    c. 35-44
    d. 45-54
    e. 55-64

    f. 65-74
    g. 75 or older
2. What is your gender?
    a. Female
    b. Male
    c. Self-describe
    d. Prefer not to say
3. Where would you describe your place of residence?
    a. Urban (in a city, or large town)
    b. Suburban (in a medium-small town)
    c. Rural (in a very small town, village, or smaller)
4. Do you have any diagnosed chronic conditions/risk factors? If so, what are these?
    a. Participants can ‘prefer not to say’ here
5. How many sessions of your programme have you attended so far?
    a. 100% of sessions
    b. Between 99-50% of sessions
    c. Under 49% of sessions

Thank you and end of the interview

- End recording
- Any further questions about the interview
- Do they want to be contacted about results?
- Reminder about token of thanks

Appendix 17: Facilitator interview topic guide

St Luke's Campus

University of Exeter,

Exeter, EX1 2LU

https://www.exeter.ac.uk/

Interview topic guide (facilitators of interventions)

This interview guide is not a script, it doesn't have to be followed strictly. The aim of each section illustrates what the questions within a section aim to cover

Research objectives

To further understand the experiences of facilitators of virtual group interventions for preventing and managing chronic physical conditions

Introduction

Aim: to ensure that participants are relaxed and informed about the purpose and structure of the interviews

- Thank you, consent forms, how the interview is going to go and why I'm doing it, no right or wrong answers, confidentiality, any questions? Start recorder
- Verbal confirmation of consent

Icebreaker

Aim: to relax participants with an easy question to start the interview and make the participants feel at ease

- Have you ever facilitated any programmes that were similar to this?
- [If they answer yes, ask the following:] How does that programme compare to this programme?
- [If they answer no, move on to **Focus 1**]

Focus 1 – Choosing virtual group programmes

Aim: to understand the context in which the facilitator came to lead the programme of interest

- How did you find out about this delivery format for this programme?

- Why did you choose this format for this programme?
- Was there anything in particular that influenced your decision to choose this mode of healthcare delivery?

Focus 2 – Barriers and facilitators to participating in virtual group interventions

Aim: to understand how easy/difficult it was for participants to access these interventions, and what factors acted as facilitators or barriers to accessing these interventions, considering aspects including technological and logistical factors, and any changes they had to make to their lives to access the intervention

- Was there anything that helped you to access the programme when you first enrolled on the programme?
- Were there any factors that made accessing the programme more difficult for you?
- Did you have to make any changes in your life in order to access the intervention?
    - For instance, did you have to buy new equipment, or learn any more skills?
- Was there anything that could have been changed to make accessing the programme easier for you?
- Did any groups of participants have better access than others?
- Did you have to change the way that you interacted with any groups of participants?

PROMPTS: including –

- Any previous experience in using technology in general/this kind of technology, using the devices needed
- Any issues with fitting it in with daily life
- Any assistance given to increase access/lack of assistance
- What kind of person do you think would find this programme easy/hard to access?

Focus 3 – Benefits and drawbacks of virtual group interventions

Aim: to understand the perceived benefits and drawbacks of being a participant in a virtual group intervention

- Did you find anything worked particularly well about this intervention?

PROMPT: Perhaps there's something about this intervention was particularly useful, compared to other types of intervention?

- Is there anything that you think didn't work so well about this intervention?

PROMPT: Is there anything that could have been improved to make the intervention better next time?

Focus 4 – Perceived effects and mechanisms of action

Aim: to understand how participants perceived the effectiveness of the intervention and what mechanisms may have influenced this effectiveness

- Can you comment on whether you've noticed any changes in yourself after having taken part in this intervention?
- Did you feel like the intervention changed your behaviour in any way?
- [If yes, ask the following:] Can you think of anything related to the intervention that may have played a part in this behaviour change? Was there anything in the intervention that might have been partially responsible for changing your behaviour?
- [If no, move onto **focus 4**]

Focus 5 – Further thoughts and wrap up

Aim: to obtain any further comments and thoughts from the participants that haven't been covered by the interview

- Do you have any further comments about the programme that you think might be useful to bring up, that we haven't yet covered?

Focus 6 – Basic information questionnaire

Aim: To obtain basic demographic information from the interview participant, to help with data analysis.

6. What is your age in years?
    a. 18-24
    b. 25-34
    c. 35-44
    d. 45-54
    e. 55-64
    f. 65-74

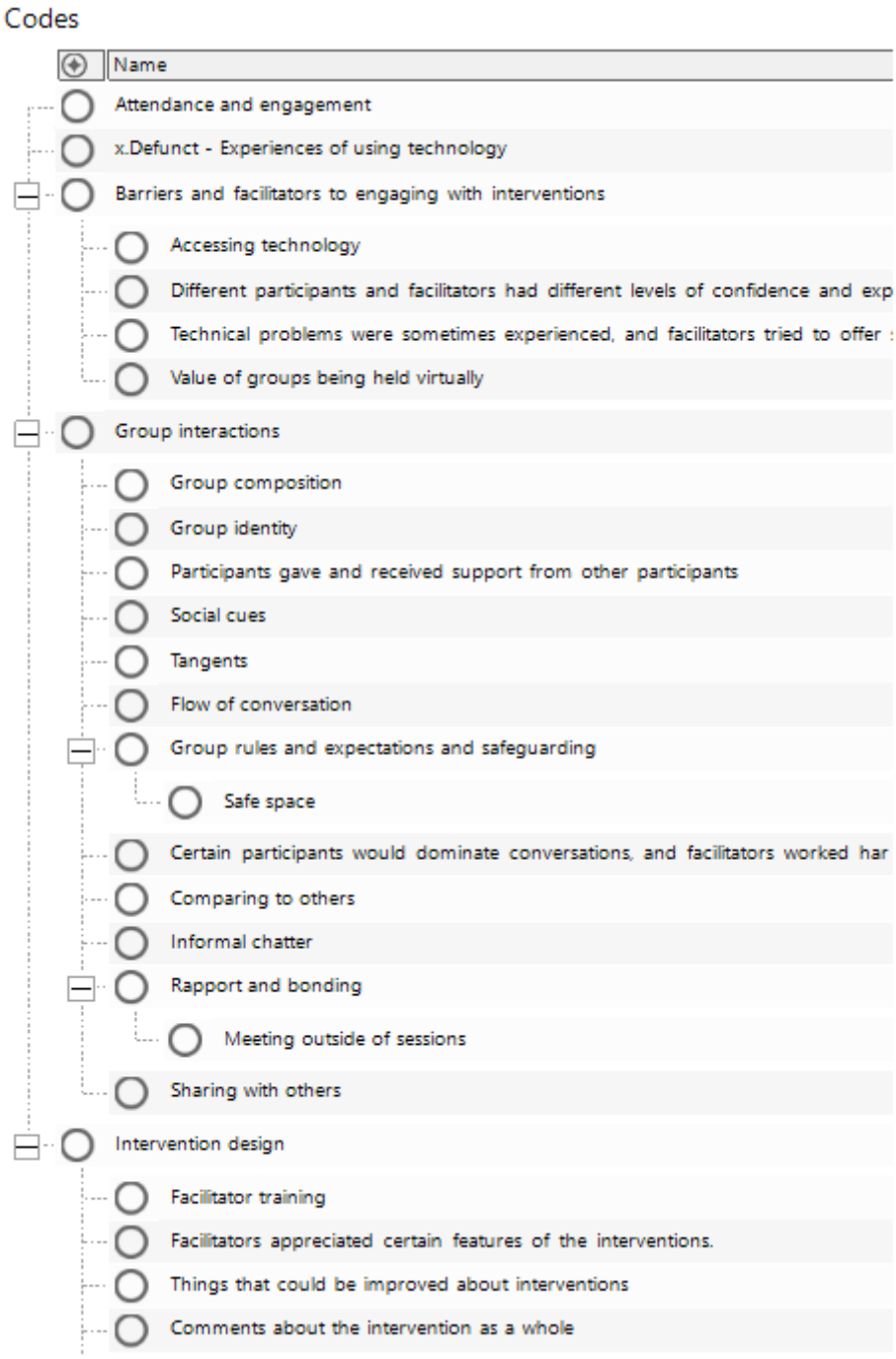
    g. 75 or older

7. What is your gender?
    a. Female
    b. Male
    c. Self-describe
    d. Prefer not to say
8. Where would you describe your place of residence?
    a. Urban (in a city, or large town)
    b. Suburban (in a medium-small town)
    c. Rural (in a very small town, village, or smaller)
9. What is your place of work?
10. What is your role?
11. How long have you been in your role?
12. What degree of experience do you have in delivering virtual group sessions?

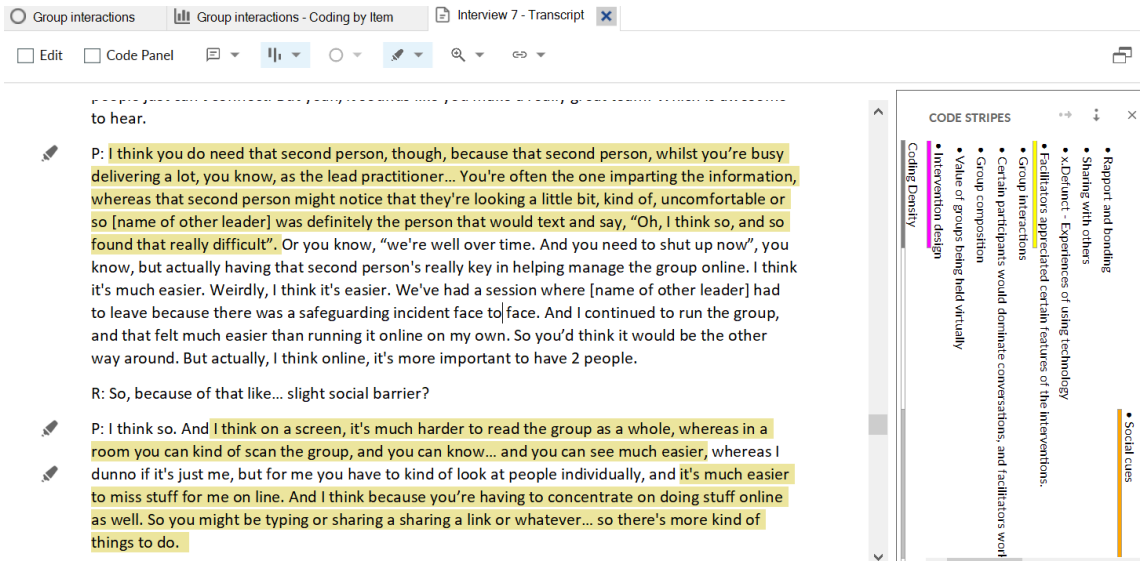
Thank you and end of the interview

- End recording
- Any further questions about the interview
- Reminder about token of thanks

Appendix 18: Examples of qualitative analysis of transcripts on NVivo



The codes on NVivo – note: one code has been redacted (Experiences of using technology), as it was combined with Intervention design (which eventually became Experiences of Intervention Features)



A sample of a transcript and initial coding on NVivo

Appendix 19: Ethics approval letter

HSC Business Services Organisation

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Health and Social Care Research Ethics Committee B (HSC REC B)

Ms Charlotte Reburn
University of Exeter Medical School
Smeall Building
St Luke's Campus, Heavitree Road, Exeter
EX1 2LU

Dear Ms Reburn

Study title:	**Exploring experiences of participants and facilitators of virtual group interventions for the prevention and management of chronic physical conditions.**
REC reference:	**23/NI/0093**
Protocol number:	**2022-23-13**
IRAS project ID:	**325953**

The Proportionate Review Sub-committee of the HSC REC B reviewed the above application on 26 June 2023.

Ethical opinion

On behalf of the Research Ethics Committee (REC), the sub-committee gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Good practice principles and responsibilities

The UK Policy Framework for Health and Social Care Research sets out principles of good practice in the management and conduct of health and social care research. It also outlines the responsibilities of individuals and organisations, including those related to the four elements of research transparency:

1. registering research studies
2. reporting results
3. informing participants
4. sharing study data and tissue

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Confirmation of Capacity and Capability (in England, Northern Ireland and Wales) or NHS management permission (in Scotland) should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for HRA and HCRW Approval (England and Wales)/ NHS permission for research is available in the Integrated Research Application System.

Appendix 20: Peer review form

University of Exeter Medical School and Health and Care Professions

Research Ethics Committee

Peer Review Form

Name of Reviewer:	Bethan Treadgold
Employing Organisation:	University of Exeter
Qualifications and area of expertise (needs to be an expert in the methods to be used or proposed topic for this project):	BSc Psychology, MSc Health Psychology, PhD Primary Care Research Expertise in qualitative research, health services research, online support groups
Details of any potential conflict of interest:	None
Name of Researcher:	Charlotte Reburn
Project Title:	Exploring experiences of participants and facilitators of virtual group interventions for the prevention and management of chronic physical conditions

What is your overall assessment of the quality of the study? Is there a clear research question/aim? Are the methods of data collection appropriate and adequately described? Are the methods of data analysis appropriate and adequately described?

Major points:

- My overall assessment of the quality of the study is very good. It is written well and clearly. The introduction to group-based interventions, rationale for the study, the design of the study, and method for analysis are all very well described and justified. The research questions and objectives are also feasible and suitable. Charlotte will have a comprehensive supervisory team with a broad range of expertise to support her, along with a dedicated PPI group who have already been involved. The study's GANTT chart also looks realistic and feasible.

Minor points:

- You justify your decision to conduct qualitative interviews very well, therefore this is only a very minor point out of interest – have you considered that focus groups as a method may be an interesting design for this study, given that the participants are used to group-based discussions and set ups?
- How does this study fit within your wider PhD research? Is it informed by other components/will inform other components?
- In terms of reaching saturation when coding your interviews, will you finalise your coding frame once saturation is reached and code using that coding frame, or continue to code?

What specific improvements would you like to see the applicant make in relation to the quality of the study?.

Major improvements:

- No major improvements.

Minor improvements:

No improvements to the quality of the study as such, just a few suggestions for clarifying parts of your proposal:

- State from the beginning that it is an online/remote qualitative interview study. it is specified quite far down in the proposal and left me wondering.
- Are typically digitally excluded populations (e.g., the elderly, those living in rural areas, those with low socio-economic status, the homeless, refugees, sex workers) going to miss out on this research, or even virtual group interventions all together? Might it be interesting to explore the experiences of a few of these groups of people in accessing these services (or not).
- It is unclear how many or which long-term conditions will be involved? It would be interesting to know. You first specify on page 11 that they are going to be all physical conditions, but do not specify excluding (e.g., mental health conditions, learning disabilities, cognitive conditions, genetic conditions).
- You have written 'research question 2' twice, I think this is a typo (change the third one to 'research question 3'.
- What other programmes alongside The NHS Diabetes Prevention Programme will you use to recruit participants from?
- Are you going to pay/incentivise participants?

What is your opinion of the originality, reliability and importance of the study?

- The study is original in the sense that a qualitative exploration of the experiences of participants and facilitators of virtual group interventions around chronic physical conditions. It is novel work.
- Whilst reliability is not necessarily a quality indicator of qualitative research, the rational for the study, methods, involving an experienced supervisory team and PPI group all contribute to this being a thorough exploration of the phenomenon.
- The study is important work and the rationale is outlined well.

Lastly, are there any potential ethical issues/risks you would like to bring to the attention of the Committee?

Major issues/risks:

- No major ethical issues/risks.

Minor issues/risks:

- No minor ethical issues/risks.

Signed: B.Treadgold

(Electronic signature required)

Date: 03.04.23

References

1. McDonagh STJ, Reburn C, Smith J, Clark C. Group-delivered interventions for lowering blood pressure in hypertension: systematic review and meta-analysis. Br J Gen Pract J R Coll Gen Pract. 2024 Aug 8;BJGP.2023.0585.

2. OECD/European Observatory on Health Systems and Policies 2019, United Kingdom - Country Health Profile 2019, State of Health in the EU, OECD Publishing, Paris/European Observatory on Health Systems and Policies, Brussels.

3. Finley CR, Chan DS, Garrison S, Korownyk C, Kolber MR, Campbell S, et al. What are the most common conditions in primary care? Systematic review. Can Fam Physician Med Fam Can. 2018 Nov;64(11):832–40.

4. Pal K, Horsfall L, Sharma M, Nazareth I, Petersen I. Time trends in the incidence of clinically diagnosed type 2 diabetes and pre-diabetes in the UK 2009–2018: a retrospective cohort study. BMJ Open Diabetes Res Care. 2021 Mar 1;9(1):e001989.

5. Tackling the crisis: Transforming diabetes care for a better future England. Diabetes UK, 2019.

6. Papadakis A, Pfoh ER, Hu B, Liu X, Rothberg MB, Misra-Hebert AD. Shared Medical Appointments and Prediabetes: The Power of the Group. Ann Fam Med. 2021;19(3):258–61.

7. Toro-Ramos T, Michaelides A, Anton M, Karim Z, Kang-Oh L, Argyrou C, et al. Mobile delivery of the diabetes prevention program in people with prediabetes: Randomized controlled trial. Albright A Barnes, Barnes, Bish, Block, Bowen, Boyle, Butryn, Butryn, Knowler, Dunkley, Fowler, Franz, Fukuoka, Geiss, Gregory, Griauzde, Jackson, Joiner, Kim, Knowler, Lee, Levine, Ma, McTigue, McTigue, Michaelides, Michaelides, Moin, O'Brien, Perreault, Rollnick, Sepah, Shirinzadeh, Sweet, Thomas, Tronieri, West, Whitley, Zercher, editor. JMIR MHealth UHealth. 2020;8(7).

8. Sampson M, Clark A, Bachmann M, Garner N, Irvine L, Howe A, et al. Lifestyle Intervention With or Without Lay Volunteers to Prevent Type 2 Diabetes in People With Impaired Fasting Glucose and/or Nondiabetic Hyperglycemia: A Randomized Clinical Trial. JAMA Intern Med. 2021 Feb 1;181(2):168–78.

9. Cannon MJ, Masalovich S, Ng BP, Soler RE, Jabrah R, Ely EK, et al. Retention Among Participants in the National Diabetes Prevention Program Lifestyle Change Program, 2012–2017. Diabetes Care. 2020 Jul 2;43(9):2042–9.

10. Lawn S, McMillan J, Pulvirenti M. Chronic condition self-management: Expectations of responsibility. Patient Educ Couns. 2011 Aug 1;84(2):e5–8.

11. Deakin M. NHS workforce shortages and staff burnout are taking a toll. BMJ. 2022 Apr 11;377:o945.

12. Karuna C, Palmer V, Scott A, Gunn J. Prevalence of burnout among GPs: a systematic review and meta-analysis. Br J Gen Pract. 2022 May 1;72(718):e316–24.

13. Shen X, Xu H, Feng J, Ye J, Lu Z, Gan Y. The global prevalence of burnout among general practitioners: a systematic review and meta-analysis. Fam Pract. 2022 Jan 28;cmab180.

14. Zareei M, Tabanejad Z, Oskouie F, Ebadi A, Mesri M. Job burnout among nurses during COVID-19 pandemic: A systematic review. J Educ Health Promot. 2022 Mar 23;11:107.

15. Fletcher E, Abel GA, Anderson R, Richards SH, Salisbury C, Dean SG, et al. Quitting patient care and career break intentions among general practitioners in South West England: findings of a census survey of general practitioners. BMJ Open. 2017 Apr 1;7(4):e015853.

16. Borek AJ, Abraham C, Greaves CJ, Tarrant M. Group-Based Diet and Physical Activity Weight-Loss Interventions: A Systematic Review and Meta-Analysis of Randomised Controlled Trials. Appl Psychol Health Well-Being. 2018;10(1):62–86.

17. Smith N, Jordan M, White R, Bowman J, Hayes C. Assessment of Adults Experiencing Chronic Non-Cancer Pain: A Randomized Trial of Group Versus Individual Format at an Australian Tertiary Pain Service. Pain Med Malden Mass. 2016 Feb;17(2):278–94.

18. Henry S, Shi L, Alexander V, O'Neal R, Carey S, Spitler HD, et al. "JUMPing into Diabetes Control": A Group-Setting Self-Empowerment Lifestyle Intervention among Diabetes Patients. Healthcare. 2020 Apr 7;8(2):90.

19. Kirsh SR, Aron DC, Johnson KD, Santurri LE, Stevenson LD, Jones KR, et al. A realist review of shared medical appointments: How, for whom, and under what circumstances do they work? BMC Health Serv Res. 2017 Feb 4;17(1):113.

20. Edelman D, McDuffie JR, Oddone E, Gierisch JM, Nagi A, Williams JW. Shared Medical Appointments for Chronic Medical Conditions: A Systematic Review [Internet]. Washington (DC): Department of Veterans Affairs (US); 2012 [cited 2023 Jul 11]. (VA Evidence-based Synthesis Program Reports). Available from: http://www.ncbi.nlm.nih.gov/books/NBK99785/

21. Swaithes L, Paskins Z, Duffy H, Evans N, Mallen C, Dziedzic K, et al. Experience of implementing and delivering group consultations in UK general practice: a qualitative study. Br J Gen Pract. 2021 Jun 1;71(707):e413–22.

22. Borek AJ, Abraham C, Greaves CJ, Tarrant M, Garner N, Pascale M. 'We're all in the same boat': A qualitative study on how groups work in a diabetes

prevention and management programme. Br J Health Psychol. 2019;24(4):787–805.

23. Odgers-Jewell K, Ball LE, Kelly JT, Isenring EA, Reidlinger DP, Thomas R. Effectiveness of group-based self-management education for individuals with Type 2 diabetes: a systematic review with meta-analyses and meta-regression. Diabet Med J Br Diabet Assoc. 2017 Aug;34(8):1027–39.

24. Valabhji J, Barron E, Bradley D, Bakhai C, Fagg J, O'Neill S, et al. Early Outcomes From the English National Health Service Diabetes Prevention Programme. Diabetes Care. 2019 Dec 12;43(1):152–60.

25. Singer J, Levy S, Shimon I. Group versus Individual Care in Patients with Long-Standing Type 1 and Type 2 Diabetes: A One-Year Prospective Noninferiority Study in a Tertiary Diabetes Clinic. J Diabetes Res. 2018;2018:1807246.

26. Papoutsi C, Colligan G, Hagell A, Hargreaves D, Marshall M, Vijayaraghavan S, et al. Promises and Perils of Group Clinics for Young People Living With Diabetes: A Realist Review. Diabetes Care. 2019 Apr 15;42(5):705–12.

27. Sampson M, Clark A, Bachmann M, Garner N, Irvine L, Howe A, et al. Lifestyle Intervention With or Without Lay Volunteers to Prevent Type 2 Diabetes in People With Impaired Fasting Glucose and/or Nondiabetic Hyperglycemia: A Randomized Clinical Trial. JAMA Intern Med. 2021 Feb 1;181(2):168–78.

28. Barnes PA, Staab EM, Campbell A, Schaefer C, Quinn MT, Baig AA. Organizational Factors Influencing the Early Implementation Process of Diabetes Group Visits by Five Midwestern Community Health Centers: A Multisite Case Study Analysis. Popul Health Manag. 2020 Aug;23(4):297–304.

29. Borek AJ, Abraham C, Greaves CJ, Gillison F, Tarrant M, Morgan-Trimmer S, et al. Identifying change processes in group-based health behaviour-change interventions: development of the mechanisms of action in group-based interventions (MAGI) framework. Health Psychol Rev. 2019 Jul 3;13(3):227–47.

30. Taube M, Gruber S, Johnson D. Primary Care Shared Medical Appointment for Pain Management: A Pilot Program. J Pain Palliat Care Pharmacother. 2021 Dec;35(4):273–7.

31. Kowalski CP, Veeser M, Heisler M. Formative evaluation and adaptation of pre-and early implementation of diabetes shared medical appointments to maximize sustainability and adoption. BMC Fam Pract. 2018 Jul 7;19(1):109.

32. The King's Fund [Internet]. 2019 [cited 2022 Feb 22]. Closing the gap. Available from: https://www.kingsfund.org.uk/publications/closing-gap-health-care-workforce

33. Znidarsic J, Kirksey KN, Dombrowski SM, Tang A, Lopez R, Blonsky H, et al. "Living Well with Chronic Pain": Integrative Pain Management via Shared Medical Appointments. Pain Med. 2021 Jan 1;22(1):181–90.

34. Prescott LS, Dickens AS, Guerra SL, Tanha JM, Phillips DG, Patel KT, et al. Fighting cancer together: Development and implementation of shared medical appointments to standardize and improve chemotherapy education. Gynecol Oncol. 2016 Jan;140(1):114–9.

35. Stenov V, Wind G, Vallis M, Reventlow S, Hempler NF. Group-based, person-centered diabetes self-management education: healthcare professionals' implementation of new approaches. BMC Health Serv Res. 2019 Jun 11;19(1):368.

36. Eysenbach G. What is e-health? J Med Internet Res [Internet]. 2001 Jun [cited 2023 Oct 26];3(2). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1761894/

37. Bosworth HB, Olsen MK, Gentry P, Orr M, Dudley T, McCant F, et al. Nurse administered telephone intervention for blood pressure control: a patient-tailored multifactorial intervention. Patient Educ Couns. 2005 Apr 1;57(1):5–14.

38. Eakin EG, Lawler SP, Vandelanotte C, Owen N. Telephone Interventions for Physical Activity and Dietary Behavior Change: A Systematic Review. Am J Prev Med. 2007 May 1;32(5):419–34.

39. Salonen P, Tarkka MT, Kellokumpu-Lehtinen PL, Åstedt-Kurki P, Luukkaala T, Kaunonen M. Telephone Intervention and Quality of Life in Patients With Breast Cancer. Cancer Nurs. 2009 Jun;32(3):177.

40. Shaw R, Bosworth H. Short message service (SMS) text messaging as an intervention medium for weight loss: A literature review. Health Informatics J. 2012 Dec 1;18(4):235–50.

41. Fjeldsoe BS, Miller YD, Marshall AL. MobileMums: A Randomized Controlled Trial of an SMS-Based Physical Activity Intervention. Ann Behav Med. 2010 May 1;39(2):101–11.

42. Wong CKH, Fung CSC, Siu SC, Lo YYC, Wong KW, Fong DYT, et al. A short message service (SMS) intervention to prevent diabetes in Chinese professional drivers with pre-diabetes: A pilot single-blinded randomized controlled trial. Diabetes Res Clin Pract. 2013 Dec 1;102(3):158–66.

43. Xiang X, Kayser J, Sun Y, Himle J. Internet-Based Psychotherapy Intervention for Depression Among Older Adults Receiving Home Care: Qualitative Study of Participants' Experiences. JMIR Aging. 2021 Nov 22;4(4):e27630.

44. Simmons VN, Heckman BW, Fink AC, Small BJ, Brandon TH. Efficacy of an experiential, dissonance-based smoking intervention for college students delivered via the internet. J Consult Clin Psychol. 2013 Oct;81(5):810–20.

45. Leahey TM, Subak LL, Fava J, Schembri M, Thomas G, Xu X, et al. Benefits of adding small financial incentives or optional group meetings to a web-based statewide obesity initiative. Obes Silver Spring Md. 2015 Jan;23(1):70–6.

46. Wundersitz C, Caelli A, Georgy J, Musovic A, Manning R, Prause M, et al. Conducting community rehabilitation review sessions via videoconference: A feasibility study. Aust J Rural Health. 2020;28(6):603–12.

47. Murphy M, Scott LJ, Salisbury C, Turner A, Scott A, Denholm R, et al. Implementation of remote consulting in UK primary care following the COVID-19 pandemic: a mixed-methods longitudinal study. Br J Gen Pract. 2021 Mar 1;71(704):e166–77.

48. Wanat M, Hoste M, Gobat N, Anastasaki M, Böhmer F, Chlabicz S, et al. Transformation of primary care during the COVID-19 pandemic: experiences of healthcare professionals in eight European countries. Br J Gen Pract. 2021 Aug 1;71(709):e634–42.

49. Ganeshan S, Jackson H, Grandis DJ, Janke D, Murray ML, Valle V, et al. Clinical Outcomes and Qualitative Perceptions of In-person, Hybrid, and Virtual Cardiac Rehabilitation. J Cardiopulm Rehabil Prev. 2022 Sep;42(5):338.

50. Steinberg RI, Begay JA, Begay PM, Goldtooth DL, Nelson STM, Yazzie DA, et al. Lessons on Resilient Research: Adapting the Tribal Turning Point Study to COVID-19. Am Indian Alsk Native Ment Health Res Online. 2022;29(2):155–82.

51. Saifan AR, Alarabyat IA, Alrimawi I, Al-Nsair N. Utilizing telehealth intervention to support patients with cardiovascular diseases in Jordan: A qualitative study. Appl Nurs Res. 2022 Dec 1;68:151641.

52. James S, Ashley C, Williams A, Desborough J, Mcinnes S, Calma K, et al. Experiences of Australian primary healthcare nurses in using telehealth during COVID-19: a qualitative study. BMJ Open. 2021 Aug 1;11(8):e049095.

53. Barnett A, Campbell KL, Mayr HL, Keating SE, Macdonald GA, Hickman IJ. Liver transplant recipients' experiences and perspectives of a telehealth-delivered lifestyle programme: A qualitative study. J Telemed Telecare. 2021 Oct 1;27(9):590–8.

54. Aung E, Pasanen L, LeGautier R, McLachlan SA, Collins A, Philip J. The role of telehealth in oncology care: A qualitative exploration of patient and clinician perspectives. Eur J Cancer Care (Engl). 2022;31(2):e13563.

55. Lipschitz JM, Connolly SL, Van Boxtel R, Potter JR, Nixon N, Bidargaddi N. Provider perspectives on telemental health implementation: Lessons learned during the COVID-19 pandemic and paths forward. Psychol Serv. 2022;No Pagination Specified-No Pagination Specified.

56. Taylor L, Ranaldi H, Amirova A, Zhang L, Ahmed AA, Dibb B. Using virtual representations in mHealth application interventions for health-related behaviour change: A systematic review. O'Connor D, editor. Cogent Psychol. 2022 Dec 31;9(1):2069906.

57. Banbury A, Nancarrow S, Dart J, Gray L, Parkinson L. Telehealth Interventions Delivering Home-based Support Group Videoconferencing: Systematic Review. J Med Internet Res. 2018 Feb 2;20(2):e25.

58. Bisno DI, Reid MW, Fogel JL, Pyatak EA, Majidi S, Raymond JK. Virtual Group Appointments Reduce Distress and Improve Care Management in Young Adults with Type 1 Diabetes. J Diabetes Sci Technol. 2022 Nov;16(6):1419–27.

59. Azar KMJ, Aurora M, Wang EJ, Muzaffar A, Pressman A, Palaniappan LP. Virtual small groups for weight management: an innovative delivery mechanism for evidence-based lifestyle interventions among obese men. Transl Behav Med. 2015 Mar;5(1):37–44.

60. Mariano TY, Wan L, Edwards RR, Lazaridou A, Ross EL, Jamison RN. Online group pain management for chronic pain: Preliminary results of a novel treatment approach to teletherapy. J Telemed Telecare. 2021 May;27(4):209–16.

61. West DS, Stansbury M, Krukowski RA, Harvey J. Enhancing group-based internet obesity treatment: A pilot RCT comparing video and text-based chat. Obes Sci Pract. 2019 Dec;5(6):513–20.

62. Lopez A, Rothberg B, Reaser E, Schwenk S, Griffin R. Therapeutic groups via video teleconferencing and the impact on group cohesion. mHealth. 2020 Apr 5;6:13.

63. Juarez-Reyes M, Mui HZ, Kling SMR, Brown-Johnson C. Accessing behavioral health care during COVID: rapid transition from in-person to teleconferencing medical group visits. Ther Adv Chronic Dis. 2021;12:2040622321990269.

64. Shapira S, Cohn-Schwartz E, Yeshua-Katz D, Aharonson-Daniel L, Clarfield AM, Sarid O. A Digital Intervention to Alleviate Loneliness and Depression Among Older Persons During the COVID-19 Outbrea. Innov Aging. 2021 Jan 1;5(Suppl 1):933–4.

65. Gray SM, Franke T, Sims-Gould J, McKay HA. Rapidly adapting an effective health promoting intervention for older adults—choose to move—for virtual delivery during the COVID-19 pandemic. BMC Public Health. 2022 Jun 11;22(1):1172.

66. Raymond JK, Berget CL, Driscoll KA, Ketchum K, Cain C, Fred Thomas JF. CoYoT1 Clinic: Innovative Telemedicine Care Model for Young Adults with Type 1 Diabetes. Diabetes Technol Ther. 2016 Jun;18(6):385–90.

67. Tokuda L, Lorenzo L, Theriault A, Taveira TH, Marquis L, Head H, et al. The utilization of video-conference shared medical appointments in rural diabetes care. Int J Med Inf. 2016 Sep;93:34–41.

68. Taetzsch A, Gilhooly CH, Bukhari A, Das SK, Martin E, Hatch AM, et al. Development of a Videoconference-Adapted Version of the Community Diabetes Prevention Program, and Comparison of Weight Loss With In-Person Program Delivery. Mil Med. 2019 Dec 1;184(11–12):647–52.

69. Cliffe M, Di Battista E, Bishop S. Can you see me? Participant experience of accessing a weight management programme via group videoconference to overcome barriers to engagement. Health Expect. 2021;24(1):66–76.

70. NHS. NHS Long Term Plan. 2019 [cited 2022 Sep 2]. NHS Long Term Plan. Available from: https://www.longtermplan.nhs.uk

71. Five Year Forward View.

72. Redquest B, Tint A, St John L, Hutton S, Palmer P, Lunsky Y. Virtual group-based mindfulness program for autistic women: A feasibility study. Womens Health Lond Engl. 2022;18:17455057221142369.

73. Bogosian A, Hurt CS, Hindle JV, McCracken LM, Vasconcelos E Sa DA, Axell S, et al. Acceptability and Feasibility of a Mindfulness Intervention Delivered via Videoconferencing for People With Parkinson's. J Geriatr Psychiatry Neurol. 2022 Jan;35(1):155–67.

74. Climans R, Berall A, Santiago AT, Gardner S, Margles D, Shnall A. Evaluation of virtual caregiver support groups for young-onset dementia family caregivers. Soc Work Groups. 2023 Apr 3;46(2):157–70.

75. Millett G, Franco G, Fiocco AJ. A Qualitative Study of the Usability and Likability of a Virtual Group-Based Social Support Program for Older Adults in Residential Care. Clin Gerontol. 2022 Dec 15;0(0):1–13.

76. Lunsky Y, Albaum C, Baskin A, Hastings RP, Hutton S, Steel L, et al. Group Virtual Mindfulness-Based Intervention for Parents of Autistic Adolescents and Adults. J Autism Dev Disord. 2021 Nov 1;51(11):3959–69.

77. Jones A, Esteban-Serna C, Proctor BJ, Yogarajah M, Agrawal N. An evaluation of initial engagement with a virtual group-based psychological treatment for functional seizures. Epilepsy Behav. 2021 Dec 1;125:108384.

78. Borek AJ, Smith JR, Greaves CJ, Gillison F, Tarrant M, Morgan-Trimmer S, et al. Developing and applying a framework to understand mechanisms of action in group-based, behaviour change interventions: the MAGI mixed-methods study. Effic Mech Eval. 2019 Jun 14;6(3):1–162.

79. Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: A concept analysis. Patient Educ Couns. 2017 Jan;100(1):30–6.

80. Scott E, Finney A, Swaithes L, Wynne-Jones G. Factors affecting uptake and delivery of video group consultations for the management of long-term conditions in primary care general practice: a systematic review. PROSPERO 2021 CRD42021220258 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021220258.

81. Stern C, Lizarondo L, Carrier J, Godfrey C, Rieger K, Salmond S, et al. Methodological guidance for the conduct of mixed methods systematic reviews. JBI Evid Synth. 2020 Oct;18(10):2108–18.

82. Friedman B, Jiang HJ, Elixhauser A. Costly Hospital Readmissions and Complex Chronic Illness. Inq J Health Care Organ Provis Financ. 2008 Nov 1;45(4):408–21.

83. Reynolds R, Dennis S, Hasan I, Slewa J, Chen W, Tian D, et al. A systematic review of chronic disease management interventions in primary care. BMC Fam Pract. 2018 Jan 9;19:11.

84. Taggart J, Williams A, Dennis S, Newall A, Shortus T, Zwar N, et al. A systematic review of interventions in primary care to improve health literacy for chronic disease behavioral risk factors. BMC Fam Pract. 2012 Jun 1;13(1):49.

85. Brice R. CASP CHECKLISTS [Internet]. CASP - Critical Appraisal Skills Programme. [cited 2022 Mar 1]. Available from: https://casp-uk.net/casp-tools-checklists/

86. RoB 2: A revised Cochrane risk-of-bias tool for randomized trials | Cochrane Bias [Internet]. [cited 2022 Feb 22]. Available from: https://methods.cochrane.org/bias/resources/rob-2-revised-cochrane-risk-bias-tool-randomized-trials

87. Sterne JA, Hernán MA, Reeves BC, Savović J, Berkman ND, Viswanathan M, et al. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. BMJ. 2016 Oct 12;355:i4919.

88. Pluye P, Gagnon MP, Griffiths F, Johnson-Lafleur J. A scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative and mixed methods primary studies in Mixed Studies Reviews. Int J Nurs Stud. 2009 Apr 1;46(4):529–46.

89. Bakhach M, Reid MW, Pyatak EA, Berget C, Cain C, Thomas JF, et al. Home Telemedicine (CoYoT1 Clinic): A Novel Approach to Improve Psychosocial Outcomes in Young Adults With Diabetes. Diabetes Educ. 2019 Aug;45(4):420–30.

90. Reid MW, Krishnan S, Berget C, Cain C, Thomas JF, Klingensmith GJ, et al. CoYoT1 Clinic: Home Telemedicine Increases Young Adult Engagement in Diabetes Care. Diabetes Technol Ther. 2018 May;20(5):370–9.

91. Azar KMJ, Koliwad S, Poon T, Xiao L, Lv N, Griggs R, et al. The Electronic CardioMetabolic Program (eCMP) for Patients With Cardiometabolic Risk: A Randomized Controlled Trial. J Med Internet Res. 2016 May 27;18(5):e134.

92. Shell AL, Hsueh L, Vrany EA, Clark DO, Keith NR, Xu H, et al. Depressive symptom severity as a predictor of attendance in the HOME behavioral weight loss trial. J Psychosom Res. 2020 Feb 15;131:109970.

93. Das SK, Bukhari AS, Taetzsch AG, Ernst AK, Rogers GT, Gilhooly CH, et al. Randomized trial of a novel lifestyle intervention compared with the Diabetes Prevention Program for weight loss in adult dependents of military service members. Am J Clin Nutr. 2021 Oct 4;114(4):1546–59.

94. Banbury A, Nancarrow S, Dart J, Gray L, Dodson S, Osborne R, et al. Adding value to remote monitoring: Co-design of a health literacy intervention for older people with chronic disease delivered by telehealth - The telehealth literacy project. Patient Educ Couns. 2020 Mar;103(3):597–606.

95. Ehlers DK, Huberty JL, de Vreede GJ. Can an evidence-based book club intervention delivered via a tablet computer improve physical activity in middle-aged women? Telemed J E-Health Off J Am Telemed Assoc. 2015 Feb;21(2):125–31.

96. Hwang R, Mandrusiak A, Morris NR, Peters R, Korczyk D, Bruning J, et al. Exploring patient experiences and perspectives of a heart failure telerehabilitation program: A mixed methods approach. Heart Lung J Crit Care. 2017;46(4):320–7.

97. Burkow TM, Vognild LK, Østengen G, Johnsen E, Risberg MJ, Bratvold A, et al. Internet-enabled pulmonary rehabilitation and diabetes education in group settings at home: a preliminary study of patient acceptability. BMC Med Inform Decis Mak. 2013 Mar 5;13(1):33.

98. Lewis A, Conway J, Middleton J, Startup CK, Wyatt J. Playing the harmonica with chronic obstructive pulmonary disease. A qualitative study. Chron Respir Dis. 2022;19:14799731221083315.

99. Marziali E. E-health program for patients with chronic disease. Telemed J E-Health Off J Am Telemed Assoc. 2009 Mar;15(2):176–81.

100. Abbott S, Parretti HM, Hazlehurst J, Tahrani AA. Socio-demographic predictors of uptake of a virtual group weight management program during the COVID-19 pandemic. J Hum Nutr Diet Off J Br Diet Assoc. 2021 Jun;34(3):480–4.

101. Robert GK, Onyari CN, Mbaka JG. Development of a Water Quality Assessment Index for the Chania River, Kenya. Afr J Aquat Sci. 2020 Nov 15;0(0):1–11.

102. Pinto R, Lemos Pires M, Borges M, Linan Pinto M, Sousa Guerreiro C, Miguel S, et al. Digital home-based multidisciplinary cardiac rehabilitation: the way to counteract physical inactivity during the COVID-19 pandemic? Eur J Prev Cardiol. 2021 May 11;28(Suppl 1):zwab061.329.

103. National Diabetes Prevention Program | Diabetes | CDC [Internet]. 2023 [cited 2023 Jan 22]. Available from: https://www.cdc.gov/diabetes/prevention/index.html

104. Exploring the UK's digital divide - Office for National Statistics [Internet]. [cited 2023 Jun 5]. Available from: https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/exploringtheuksdigitaldivide/2019-03-04

105. Charness N, Boot WR. A Grand Challenge for Psychology: Reducing the Age-related Digital Divide. Curr Dir Psychol Sci. 2022;31(2):187–93.

106. Song Y, Qian C, Pickard S. Age-Related Digital Divide during the COVID-19 Pandemic in China. Int J Environ Res Public Health. 2021 Jan;18(21):11285.

107. Wu YH, Damnée S, Kerhervé H, Ware C, Rigaud AS. Bridging the digital divide in older adults: a study from an initiative to inform older adults about new technologies. Clin Interv Aging. 2015;10:193–200.

108. Age UK [Internet]. [cited 2023 Jun 5]. Become an Age UK digital buddy. Available from: https://www.ageuk.org.uk/get-involved/volunteer/become-an-age-uk-digital-buddy/

109. Age UK. Briefing Paper: Digital inclusion and older people – how have things changed in a Covid-19 world? 2019. Available from: https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/active-communities/digital-inclusion-in-the-pandemic-final-march-2021.pdf

110. Haslam CH Jolanda Jetten, Tegan Cruwys, Genevieve Dingle, S Alexander. The New Psychology of Health: Unlocking the Social Cure. London: Routledge; 2018. 510 p.

111. Tarrant M, Haslam C, Carter M, Calitri R, Haslam SA. Social Identity Interventions. In: Hamilton K, Cameron LD, Hagger MS, Hankonen N, Lintunen T, editors. The Handbook of Behavior Change [Internet]. Cambridge: Cambridge University Press; 2020 [cited 2023 Jun 6]. p. 649–60. (Cambridge Handbooks in Psychology). Available from: https://www.cambridge.org/core/books/handbook-of-behavior-change/social-identity-interventions/B967A5A5E4F61C3929EAEE0CF8B388B0

112. Steffens NK, Haslam SA, Schuh SC, Jetten J, van Dick R. A Meta-Analytic Review of Social Identification and Health in Organizational Contexts. Personal Soc Psychol Rev. 2017 Nov 1;21(4):303–35.

113. Reinwand DA, Schulz DN, Crutzen R, Kremers SP, Vries H de. Who Follows eHealth Interventions as Recommended? A Study of Participants' Personal Characteristics From the Experimental Arm of a Randomized Controlled Trial. J Med Internet Res. 2015 May 11;17(5):e3932.

114. Chubak J, Anderson ML, Saunders KW, Hubbard RA, Tuzzio L, Liss DT, et al. Predictors of 1-Year Change in Patient Activation in Older Adults with Diabetes Mellitus and Heart Disease. J Am Geriatr Soc. 2012;60(7):1316–21.

115. Ko SH, Park SA, Cho JH, Ko SH, Shin KM, Lee SH, et al. Influence of the Duration of Diabetes on the Outcome of a Diabetes Self-Management Education Program. Diabetes Metab J. 2012 Jun 14;36(3):222–9.

116. Indelicato L, Dauriz M, Santi L, Bonora F, Negri C, Cacciatori V, et al. Psychological distress, self-efficacy and glycemic control in type 2 diabetes. Nutr Metab Cardiovasc Dis. 2017 Apr 1;27(4):300–6.

117. Joensen LE, Tapager I, Willaing I. Diabetes distress in Type 1 diabetes—a new measurement fit for purpose. Diabet Med. 2013;30(9):1132–9.

118. Papoutsi C, Shaw S, Greenhalgh T. Implementing video group consultations in general practice during COVID-19: a qualitative study. Br J Gen Pract. 2022 Jul 1;72(720):e483–91.

119. Sabourin BC, Vallis TM, Currie Rp Shannon. Development and Pilot-Testing of a Brief Psychosocial Group Intervention Protocol for Type 2 Diabetes Self-Management. Can J Diabetes. 2011 Jan 1;35(3):287–94.

120. Villegas V, Shah A, Manson JE, Tobias DK. Prevention of type 2 diabetes through remotely administered lifestyle programs: A systematic review. Contemp Clin Trials. 2022 Aug 1;119:106817.

121. Grafft N, Aftosmes-Tobio A, Gago C, Lansburg K, Beckerman-Hsu J, Trefry B, et al. Adaptation and implementation outcomes of a parenting program for low-income, ethnically diverse families delivered virtually versus in-person. Transl Behav Med. 2022 Nov 1;12(11):1065–75.

122. Lapid MI, Atherton PJ, Kung S, Clark MM, Sloan JA, Whitford KJ, et al. A feasibility study of virtual group therapy to improve quality of life of cancer caregivers. J Psychosoc Oncol. 2022 Nov 2;40(6):854–67.

123. Mc Sharry J, Dinneen SF, Humphreys M, O'Donnell M, O'Hara MC, Smith SM, et al. Barriers and facilitators to attendance at Type 2 diabetes structured education programmes: a qualitative study of educators and attendees. Diabet Med. 2019;36(1):70–9.

124. Hvidt EA, Atherton H, Keuper J, Kristiansen E, Lüchau EC, Norberg BL, et al. Low Adoption of Video Consultations in Post–COVID-19 General Practice in Northern Europe: Barriers to Use and Potential Action Points. J Med Internet Res. 2023 May 22;25(1):e47173.

125. Michie S, van Stralen MM, West R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implement Sci. 2011 Apr 23;6(1):42.

126. Petrou C, Jameel L, Nahabedian N, Kane F. A call for digital inclusion initiatives in mental health services: An integrative review. J Psychiatr Ment Health Nurs [Internet]. [cited 2023 May 31];n/a(n/a). Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/jpm.12931

127. Nouri S, Khoong EC, Lyles CR, Karliner L. Addressing Equity in Telemedicine for Chronic Disease Management During the Covid-19 Pandemic. Catal Non-Issue Content [Internet]. 2020 May 4 [cited 2023 Jun 8];1(3). Available from: https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0123

128. Horigan G, Davies M, Findlay-White F, Chaney D, Coates V. Reasons why patients referred to diabetes education programmes choose not to attend: a systematic review. Diabet Med. 2017;34(1):14–26.

129. Parameswaran UD, Pentecost R, Williams M, Smid M, Latendresse G. Experiences with use of technology and telehealth among women with perinatal depression. BMC Pregnancy Childbirth. 2022 Jul 18;22(1):571.

130. Wilson C, Alam R, Latif S, Knighting K, Williamson S, Beaver K. Patient access to healthcare services and optimisation of self-management for ethnic minority populations living with diabetes: a systematic review. Health Soc Care Community. 2012;20(1):1–19.

131. Majeed-Ariss R, Jackson C, Knapp P, Cheater FM. A systematic review of research into black and ethnic minority patients' views on self-management of type 2 diabetes. Health Expect Int J Public Particip Health Care Health Policy. 2015 Oct;18(5):625–42.

132. Rosen R, Wieringa S, Greenhalgh T, Leone C, Rybczynska-Bunt S, Hughes G, et al. Clinical risk in remote consultations in general practice: findings from in-COVID-19 pandemic qualitative research. BJGP Open [Internet]. 2022 Sep 1 [cited 2023 Jun 15];6(3). Available from: https://bjgpopen.org/content/6/3/BJGPO.2021.0204

133. Read Paul L, Salmon C, Sinnarajah A, Spice R. Web-based videoconferencing for rural palliative care consultation with elderly patients at home. Support Care Cancer. 2019 Sep 1;27(9):3321–30.

134. Spain D, Stewart GR, Mason D, Milner V, Fairhurst B, Robinson J, et al. Telehealth Autism Diagnostic Assessments With Children, Young People,

and Adults: Qualitative Interview Study With England-Wide Multidisciplinary Health Professionals. JMIR Ment Health. 2022 Jul 20;9(7):e37901.

135. Wherton J, Greenhalgh T, Hughes G, Shaw SE. The Role of Information Infrastructures in Scaling up Video Consultations During COVID-19: Mixed Methods Case Study Into Opportunity, Disruption, and Exposure. J Med Internet Res. 2022 Nov 10;24(11):e42431.

136. Fredrix M, Byrne M, Dinneen S, McSharry J. 'It's an important part, but I am not quite sure that it is working': educators' perspectives on the implementation of goal-setting within the 'DAFNE' diabetes structured education programme. Diabet Med. 2019;36(1):80–7.

137. Tarrant M, Khan SS, Farrow CV, Shah P, Daly M, Kos K. Patient experiences of a bariatric group programme for managing obesity: A qualitative interview study. Br J Health Psychol. 2017;22(1):77–93.

138. Andersen LN, Kohberg M, Herborg LG, Søgaard K, Roessler KK. "Here we're all in the same boat" – a qualitative study of group based rehabilitation for sick-listed citizens with chronic pain. Scand J Psychol. 2014;55(4):333–42.

139. Burkow TM, Vognild LK, Johnsen E, Bratvold A, Risberg MJ. Promoting exercise training and physical activity in daily life: a feasibility study of a virtual group intervention for behaviour change in COPD. BMC Med Inform Decis Mak. 2018 Dec 18;18(1):136.

140. Hogg L, Grant A, Garrod R, Fiddler H. People with COPD perceive ongoing, structured and socially supportive exercise opportunities to be important for maintaining an active lifestyle following pulmonary rehabilitation: a qualitative study. J Physiother. 2012;58(3):189–95.

141. Papoutsi C, Hargreaves D, Hagell A, Hounsome N, Skirrow H, Muralidhara K, et al. Group clinics for young adults living with diabetes in an ethnically diverse, socioeconomically deprived population: mixed-methods evaluatio. 2022 [cited 2023 Jun 8]; Available from: https://www.ncbi.nlm.nih.gov/books/NBK583574

142. Ma C, Zhou W, Tang Q, Huang S. The impact of group-based Tai chi on health-status outcomes among community-dwelling older adults with hypertension. Heart Lung. 2018 Jul 1;47(4):337–44.

143. Borek AJ, Abraham C. How do Small Groups Promote Behaviour Change? An Integrative Conceptual Review of Explanatory Mechanisms. Appl Psychol Health Well-Being. 2018;10(1):30–61.

144. Dale SK, Grimes T, Miller L, Ursillo A, Drainoni ML. "In our stories": The perspectives of women living with HIV on an evidence-based group intervention. J Health Psychol. 2017 Jul 1;22(8):1035–45.

145. Ayadi AME, Duggal M, Bagga R, Singh P, Kumar V, Ahuja A, et al. A Mobile Education and Social Support Group Intervention for Improving

Postpartum Health in Northern India: Development and Usability Study. JMIR Form Res. 2022 Jun 29;6(6):e34087.

146. Borek AJ, Smith JR, Greaves CJ, Gillison F, Tarrant M, Morgan-Trimmer S, et al. Developing and applying a framework to understand mechanisms of action in group-based, behaviour change interventions: the MAGI mixed-methods study [Internet]. Southampton (UK): NIHR Journals Library; 2019 [cited 2022 Apr 1]. (Efficacy and Mechanism Evaluation). Available from: http://www.ncbi.nlm.nih.gov/books/NBK542768/

147. Preuhs K, Klein Velderman M, van Empelen P. Possibilities and Challenges of Delivering Health-Related Small Group Interventions Online: Scoping Review. Interact J Med Res. 2023 Jun 20;12:e43783.

148. Brimelow RE, Thangavelu K, Beattie R, Dissanayaka NN. Feasibility of Group-Based Multiple Virtual Reality Sessions to Reduce Behavioral and Psychological Symptoms in Persons Living in Residential Aged Care. J Am Med Dir Assoc. 2022 May 1;23(5):831-837.e2.

149. Browne J, Battaglini C, Jarskog LF, Sheeran P, Abrantes AM, Elliott T, et al. Virtual group-based walking intervention for persons with schizophrenia: A pilot randomized controlled trial. Ment Health Phys Act. 2023 Mar 1;24:100515.

150. Childs AW, Unger A, Li L. Rapid design and deployment of intensive outpatient, group-based psychiatric care using telehealth during coronavirus disease 2019 (COVID-19). J Am Med Inform Assoc. 2020 Sep 1;27(9):1420–4.

151. Reburn C, Smith J, Cockroft E, McDonagh S, Abel G, Tarrant M, Borek A. Patient engagement with and experiences of virtual group interventions in primary and community care for adults with, and at risk of developing, common chronic physical conditions: a mixed-methods systematic review. PROSPERO 2022 CRD42022325804 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42022325804.

152. Torjesen I. NHS England rolls out world's first national diabetes prevention programme. BMJ. 2016 Mar 22;352:i1669.

153. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006 Jan 1;3(2):77–101.

154. Saks M, Allsop J. Researching Health: Qualitative, Quantitative and Mixed Methods. SAGE; 2012. 644 p.

155. Braun V, Clarke V. To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales. Qual Res Sport Exerc Health. 2021 Mar 4;13(2):201–16.

156. Diabetes Prevention | Xyla Health & Wellbeing [Internet]. 2021 [cited 2023 Jan 27]. Available from: https://xylahealthandwellbeing.com/our-services/diabetes-prevention/

157. Home – Healthy Parent Carers [Internet]. [cited 2023 Jan 27]. Available from: https://healthyparentcarers.org/

158. Robinson D. University of Exeter [Internet]. [cited 2023 Feb 10]. Available from: https://www.exeter.ac.uk/staff/employment/payandconditions/participationpaymentstoresearchvolunteers/

159. General Data Protection Regulation (GDPR) [Internet]. [cited 2023 Mar 10]. General Data Protection Regulation (GDPR) – Official Legal Text. Available from: https://gdpr-info.eu/

160. Braun V, Clarke V. Conceptual and design thinking for thematic analysis. Qual Psychol. 2022;9(1):3–26.

161. Lau B, Sharma I, Manku S, Kobylianski J, Wong LY, Ibáñez-Carrasco F, et al. Considerations for developing and implementing an online community-based exercise intervention with adults living with HIV: a qualitative study. BMJ Open. 2022 Apr 1;12(4):e059294.

162. Lloyd J, Bjornstad G, Borek A, Cuffe-Fuller B, Fredlund M, McDonald A, et al. Healthy Parent Carers programme: mixed methods process evaluation and refinement of a health promotion intervention. BMJ Open. 2021 Aug 1;11(8):e045570.

163. Rodrigues AM, Haste A, Penn L, Bell R, Summerbell C, White M, et al. Stakeholders' perceptions and experiences of the National Health Service diabetes prevention programme in England: qualitative study with service users, intervention providers and deliverers, commissioners and referrers. BMC Health Serv Res. 2020 Apr 15;20(1):307.

164. Ljung S, Olsson C, Rask M, Lindahl B. Patient Experiences of a Theory-Based Lifestyle-Focused Group Treatment in the Prevention of Cardiovascular Diseases and Type 2 Diabetes. Int J Behav Med. 2013 Sep 1;20(3):378–84.

165. Pomery A, Schofield P, Xhilaga M, Gough K. Skills, knowledge and attributes of support group leaders: A systematic review. Patient Educ Couns. 2016 May 1;99(5):672–88.

166. Blicher-Hansen J, Chilcot J, Gardner B. Experiences of successful physical activity maintenance among adults with type 2 diabetes: a theory-based qualitative study. Psychol Health. 2022 Apr 27;0(0):1–18.

167. Kok MSY, Bryant L, Cook C, Blackmore S, Jones M. Integrating Local Knowledge into a National Programme: Evidence from a Community-Based Diabetes Prevention Education Programme. Healthcare. 2019 Mar;7(1):38.

168. Damhus CS, Emme C, Hansen H. Barriers and enablers of COPD telerehabilitation – a frontline staff perspective. Int J Chron Obstruct Pulmon Dis. 2018 Aug 17;13:2473–82.

169. Nielsen SG, Danielsen JH, Grønbæk HN, Molsted S, Jacobsen SS, Vilsbøll T, et al. Transforming Motivation for Exercise in a Safe and Kind Environment—A Qualitative Study of Experiences among Individuals with Type 2 Diabetes. Int J Environ Res Public Health. 2022 Jan;19(10):6091.

170. Bohn-Goldbaum E, Cashmore A, Bauman A, Sullivan A, Fonua L (Rose), Milat A, et al. Team members influence retention in a First Peoples' community-based weight-loss program. Prev Med Rep. 2022 Apr 1;26:101710.

171. Penn L, Dombrowski SU, Sniehotta FF, White M. Participants' perspectives on making and maintaining behavioural changes in a lifestyle intervention for type 2 diabetes prevention: a qualitative study using the theory domain framework. BMJ Open. 2013 Jun 1;3(6):e002949.

172. Knights F, Carter J, Deal A, Crawshaw AF, Hayward SE, Jones L, et al. Impact of COVID-19 on migrants' access to primary care and implications for vaccine roll-out: a national qualitative study. Br J Gen Pract J R Coll Gen Pract. 2021 Aug;71(709):e583–95.

173. Rigby RR, Mitchell LJ, Hamilton K, Ball L, Williams LT. Analyzing Dietary Behaviors Self-reported by People With Diabetes Using a Behavior Change Technique Taxonomy. J Nutr Educ Behav. 2022 Aug 1;54(8):753–63.

174. Vindrola-Padros C. Doing Rapid Qualitative Research. SAGE; 2021. 198 p.

175. Wanat M, Borek AJ, Pilbeam C, Anthierens S, Tonkin-Crine S. Conducting rapid qualitative interview research during the COVID-19 pandemic—Reflections on methodological choices. Front Sociol [Internet]. 2022 [cited 2023 Sep 1];7. Available from: https://www.frontiersin.org/articles/10.3389/fsoc.2022.953872

176. Appleton R, Williams J, Juan NVS, Needle JJ, Schlief M, Jordan H, et al. Implementation, Adoption, and Perceptions of Telemental Health During the COVID-19 Pandemic: Systematic Review. J Med Internet Res. 2021 Dec 9;23(12):e31746.