Exploring remote models of physiotherapy service
delivery for people with osteoarthritis

Belinda Joan Lawford

ORCID ID: 0000-0002-0392-6058

Submitted in total fulfilment of the requirements for the degree of Doctor
of Philosophy

April 2018

Centre for Health, Exercise and Sports Medicine
Department of Physiotherapy
Faculty of Medicine, Dentistry and Health Sciences
The University of Melbourne
Knee and hip osteoarthritis (OA) is highly prevalent and has a significant burden on both the individual sufferer and society. All current clinical guidelines recommend education and exercise for management of OA, however exercise participation amongst people with OA is sub-optimal. Barriers to exercise uptake and adherence include inequitable access to appropriate healthcare, and difficulties changing behaviour and incorporating exercise into daily life. This thesis explores remote models of service delivery (telerehabilitation) as a potential method of improving exercise participation in people with OA. Specifically, this thesis aimed to explore the perceived acceptability of telerehabilitation services amongst people with OA and physiotherapists, and also investigate physiotherapist training in behaviour change techniques and person-centred care for telephone-delivery.

Study 1 involved a survey that investigated the perceptions people with knee and/or hip OA (n=330) have towards the delivery of exercise therapy by a physiotherapist via internet-mediated video and telephone consultations. Participants had overall positive perceptions, acknowledging ease of use and time saving advantages. However, most (>50%) did not agree that they would like the lack of physical contact, that they would be willing to pay for telerehabilitation services, that telephone-delivery would be effective, or that a physiotherapist would be able to adequately monitor their condition via telephone.

Study 2 involved a survey that investigated the perceptions of physiotherapists (n=217) towards the delivery of exercise therapy via internet-mediated video and telephone consultations for people with OA. Most physiotherapists agreed such services would save patient’s time and maintain their privacy, but most did not believe they would like the
lack of physical contact with patients. In addition, physiotherapists favoured the use of video technologies over telephone, with most feeling uncertain about the safety, effectiveness, usefulness, or acceptability of telephone-delivered care.

Study 3 qualitatively explored physiotherapists’ (n=8) perceptions before and after a training program in behaviour change techniques and person-centred principles that was done in preparation for a clinical trial involving the delivery of exercise therapy via telephone. After training, physiotherapists’ perceptions about their role managing patients with OA had changed, increasing their feelings of responsibility to assist their patient with exercise adherence, and they felt confident and prepared to deliver the intervention remotely via telephone.

Study 4 evaluated the fidelity of physiotherapists from Study 3 (n=8) to the behaviour change techniques and person-centred principles taught during training, and involved both self- and expert audits of practice telephone consultations. Physiotherapists performed moderately well, but had room for improvement from further practice and/or training. Physiotherapists’ self-ratings of performance generally agreed with expert ratings, however they tended to underestimate their ability to implement some principles and techniques.

Study 5 explored the perceptions of people with knee OA (n=20) who participated in a clinical trial involving telephone-delivered exercise therapy by a physiotherapist. Although participants were initially sceptical about receiving care via telephone, they described mostly positive experiences, valuing the sense of undivided focus and attention and feeling confident performing their exercise program without supervision.
Study 6 explored how experience delivering exercise therapy via telephone as part of a
clinical trial changed physiotherapists’ (n=8) perceptions about such services. Physiotherapists were initially sceptical about the effectiveness of telephone-delivered service models, expressing concern about the lack of physical and visual contact. However, after experience, physiotherapists were pleasantly surprised by the effectiveness of the intervention and by the positive outcomes that they were able to achieve with their participants.

Collectively, findings from this thesis suggest that, overall, telerehabilitation is perceived to be an acceptable model of service delivery by people with OA and physiotherapists. Although there was evidence of scepticism about the effectiveness of telephone-delivered care amongst those who are inexperienced, particularly physiotherapists, these perceptions appeared to change with experience. Physiotherapists believed that training in behaviour change techniques and person-centred care helped them communicate effectively via telephone and also changed their perceptions about their role managing patients with OA. Findings from this thesis can be used to inform the future design and implementation of telerehabilitation services and clinician training programs.
Declaration

This is to certify that:

(i) This thesis comprises only my original work towards the Doctor of Philosophy;

(ii) Due acknowledgement has been made in the text to all other material used;

(iii) This thesis is less than 100,000 words length, exclusive of tables, references and appendices.

Belinda Lawford
Acknowledgements

I would like to acknowledge a number of people who have supported me during my candidature.

Firstly, my sincere thanks to my principal supervisor, Professor Rana Hinman, for teaching me so much over the past three years. Thank you for your patience and guidance, for always making time for me, and helping me to continually improve my work and writing skills. Your efficiency and hard work were always greatly appreciated.

To Professor Kim Bennell, thank you so much for all of your support, wisdom, and continual words of encouragement. I have learnt so much from your incredible knowledge, perspective, and experience, and always appreciated how efficient and available you were.

To Associate Professor Clare Delany, thank you so much for patiently teaching me how to come to grips with qualitative research. I knew relatively little at the start of my candidature, but now feel much more comfortable conducting interviews and analysing qualitative data. Thank you!

A big thank you to everyone at CHESM who has supported me and given encouragement throughout my candidature. A special thanks to Penny Campbell for organising all of my qualitative interviews and running Facebook advertisements for me. Thanks to everyone in the PhD office for always helping to keep things in perspective and always having an understanding ear available. Another special thanks to Pip Nicolson – especially for
patiently answering/putting up with all my thesis-writing questions over these last few months! Finally, a big thank you to all of my friends and family outside of the university for their unwavering support and encouragement over the last three years.
Preface

Author contributions for submitted and published manuscripts (Chapters 3, 4, 6, 7, 8, 9) are outlined in the preface to each relevant chapter. The PhD candidate collected all data included in this thesis, completed statistical/qualitative analysis, and wrote the first draft of each manuscript submitted to journals for peer-review. The publication status of each study is as follows:

1. Chapter 3 (Study 1): Published by *Arthritis Care & Research* in October 2016.
2. Chapter 4 (Study 2): Published by *Arthritis Care & Research* in April 2017.
3. Chapter 6 (Study 3): Published by *Arthritis Care & Research* in June 2017.
4. Chapter 7 (Study 4): Submitted for publication to *Trials* in December 2017.
5. Chapter 8 (Study 5): Published by *Osteoarthritis & Cartilage* in March 2018.
6. Chapter 9 (Study 6): Submitted for publication to *Arthritis Care & Research* in March 2018.

The candidate was supported by a PhD stipend from the National Health & Medical Research Council Centre of Research Excellence (#1079078). The studies presented in Chapter 3 and 4 were supported by funding from the National Health & Medical Research Council (Program Grant #631717 and Centre of Research Excellence #1079078). The studies presented in Chapter 6, 7, 8, and 9 were supported by funding from the National Health and Medical Research Council (Partnership Project #1112133 and Centre of Research Excellence (#1079078)) and the Medibank Better Health Foundation, with in-kind support from MOVE muscle, bone and joint health (formerly Arthritis & Osteoporosis Victoria), HealthChange Australia and the Australian Physiotherapy Association.
Publications relevant to this thesis:


Publications under peer review:


Other publications produced during PhD candidature:


Conference presentations:


Table of Contents

Abstract ................................................................................................................. ii

Declaration ........................................................................................................... v

Acknowledgements .............................................................................................. vi

Preface .................................................................................................................. viii

Papers, publications, presentations ................................................................. ix

List of Tables ...................................................................................................... xvii

List of Figures ..................................................................................................... xviii

Chapter 1 Introduction and overview of chapters ........................................ 1

Chapter 2 Literature Review ............................................................................ 6
  2.1 Problem of osteoarthritis ........................................................................... 6
    2.1.1 Definition and classification ............................................................... 6
    2.1.2 Prevalence and incidence .................................................................. 7
    2.1.3 Personal and socioeconomic burden of the condition ....................... 10

  2.2 Management of osteoarthritis ................................................................. 13
    2.2.1 Education ......................................................................................... 16
    2.2.2 Exercise and physical activity .......................................................... 18

  2.3 Barriers to exercise and physical activity participation ........................... 25
    2.3.1 Accessibility of care .......................................................................... 27
    2.3.2 Clinician behaviour may negatively impact patient adherence to exercise 29

  2.4 Telehealth/Telerehabilitation ................................................................... 31
2.4.1 Telerehabilitation for people with osteoarthritis ............................. 34
2.4.2 Acceptability of telerehabilitation .................................................. 38

2.5 Supporting exercise adherence and behaviour change ..................... 42
2.5.1 Behaviour change support .............................................................. 43
2.5.2 Person-centred care ................................................................. 45
2.5.3 Training clinicians in behaviour change support and person-centred care 48

2.6 Summary and aims of the thesis ...................................................... 52

Chapter 3 Consumer perceptions of, and willingness to use, remotely-delivered
service models for exercise management of knee and hip osteoarthritis: a cross-
sectional survey .................................................................................. 54

Chapter 4 Physical therapists’ perceptions of telephone and internet video-
mediated service models for exercise management of people with osteoarthritis .............................................. 65

Chapter 5 Telecare trial methods ............................................................ 77
5.1 Design ............................................................................................. 77
5.2 Participants ...................................................................................... 77
5.3 Randomisation and blinding ............................................................... 79
5.4 Usual care ....................................................................................... 80
5.5 Intervention .................................................................................... 80
5.6 Outcomes ..................................................................................... 85

Chapter 6 Training physical therapists in person-centred practice for people with
osteoarthritis: a qualitative case study .................................................. 86

Chapter 7 Fidelity of physiotherapists to person-centred practice principles and
behaviour change techniques after training: lessons from the Telecare randomised
controlled trial .................................................................................... 100
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>Introduction</td>
<td>104</td>
</tr>
<tr>
<td>7.2</td>
<td>Methods</td>
<td>105</td>
</tr>
<tr>
<td>7.2.1</td>
<td>Participants</td>
<td>105</td>
</tr>
<tr>
<td>7.2.2</td>
<td>Training program</td>
<td>106</td>
</tr>
<tr>
<td>7.2.3</td>
<td>Patient consultations</td>
<td>109</td>
</tr>
<tr>
<td>7.2.4</td>
<td>Fidelity assessment</td>
<td>110</td>
</tr>
<tr>
<td>7.2.5</td>
<td>Data analysis</td>
<td>111</td>
</tr>
<tr>
<td>7.3</td>
<td>Results</td>
<td>111</td>
</tr>
<tr>
<td>7.3.1</td>
<td>Use of person-centred practice principles</td>
<td>112</td>
</tr>
<tr>
<td>7.3.2</td>
<td>Use of essential behaviour change techniques</td>
<td>117</td>
</tr>
<tr>
<td>7.4</td>
<td>Discussion</td>
<td>119</td>
</tr>
<tr>
<td>7.5</td>
<td>Conclusions</td>
<td>122</td>
</tr>
<tr>
<td>References</td>
<td></td>
<td>122</td>
</tr>
</tbody>
</table>

Chapter 8 “I was really sceptical...But it worked really well”: a qualitative study of patient perceptions of telephone-delivered exercise therapy by physiotherapists for people with knee osteoarthritis. ........................................... 127

Chapter 9 “I was really pleasantly surprised”: experience shifts physiotherapists’ perceptions of telephone-delivered exercise therapy for knee osteoarthritis. A qualitative study.......................................................... 162

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td>Introduction</td>
<td>165</td>
</tr>
<tr>
<td>9.2</td>
<td>Methods</td>
<td>166</td>
</tr>
<tr>
<td>9.2.1</td>
<td>Design</td>
<td>166</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Participants</td>
<td>167</td>
</tr>
<tr>
<td>9.2.3</td>
<td>Intervention</td>
<td>167</td>
</tr>
<tr>
<td>9.2.4</td>
<td>Interviews</td>
<td>169</td>
</tr>
</tbody>
</table>
9.2.5 Data analysis ........................................................................................................................................ 171

9.3 Results .................................................................................................................................................. 172

9.3.1 Participants ....................................................................................................................................... 172

9.3.2 Pre-intervention perceptions of telephone-delivered care (Table 3) .............................................. 173

9.3.3 Post-intervention perceptions of telephone-delivered care (Table 4) ........................................... 177

9.4 Discussion ............................................................................................................................................. 183

References .................................................................................................................................................. 189

Chapter 10 Discussion and implications ................................................................................................. 195

10.1 Summary of main findings ............................................................................................................... 195

10.2 Implications of findings ..................................................................................................................... 198

10.2.1 Acceptability of telerehabilitation ................................................................................................. 198

10.2.2 Physiotherapist training ............................................................................................................... 205

10.3 Strengths of the research .................................................................................................................. 208

10.4 Limitations of the research .............................................................................................................. 210

10.5 Directions for future research ......................................................................................................... 211

10.6 Conclusion .......................................................................................................................................... 212

References .................................................................................................................................................. 214

Appendices ................................................................................................................................................. 242

Appendix A: Copyright permission for Chapter 3 .................................................................................... 242

Appendix B: Telerehabilitation survey for people with osteoarthritis – Chapter 3 .................................. 246

Appendix C: Copyright permission for Chapter 4 ..................................................................................... 257

Appendix D: Physiotherapist telerehabilitation survey – Chapter 4 ....................................................... 261

Appendix E: Copyright permission for Chapter 6 .................................................................................... 269
Appendix F: Pre- and post-training semi-structured interview questions and prompts – Chapter 6 .......................... 273
Appendix G: Consultation audit form – Chapter 7 ................................................. 274
Appendix H: Copyright permission for Chapter 8 ................................................. 276
List of Tables

Table 2.1 Common identified modifiable barriers and facilitators to exercise participation amongst people with OA. Adapted from Dobson et al. (2016)............. 27
Table 5.1. Home exercise protocol. Taken from Hinman et al. (2017b)...................... 83
List of Figures

Figure 2.1 Prevalence of knee osteoarthritis by age, sex, year, and region. Taken from Cross et al. (2014). ................................................................. 8

Figure 2.2. Risk factors for the development of osteoarthritis. Taken from Lohmander et al. (2007). .................................................................................. 10

Figure 2.3. Direct, indirect, and intangible costs contributing to the personal and socioeconomic burden of osteoarthritis. Adapted from Hunter et al. (2014) .............. 11

Figure 2.4. Projected prevalence of osteoarthritis in Australia. Taken from Ackerman et al. (2016) ........................................................................ 13

Figure 2.5. National Institute for Health and Clinical Excellence (NICE) osteoarthritis management recommendations. Taken from Conaghan et al. (2008) ................. 15

Figure 2.6. Forest plot of changes in pain following exercise for knee osteoarthritis. Taken from Fransen et al. (2015). ............................................................. 20

Figure 2.7. Forest plot of changes in physical function after exercise for knee osteoarthritis. Taken from Fransen et al. (2015). ...................................................... 21

Figure 2.8. Forest plot of changes in quality of life after exercise for knee osteoarthritis. Taken from Fransen et al. (2015). ............................................................. 22

Figure 2.9. Effectiveness of different types of exercise for improving pain and physical function amongst people with knee osteoarthritis. Taken from Fransen et al. (2015). 22

Figure 2.10. An example of the graded relationship between physical activity and physical function in people with osteoarthritis. Taken from Dunlop et al. (2011) .... 24

Figure 2.11. Overview of barriers to exercise participation amongst people with osteoarthritis that are the focus of this thesis. Adapted from Petursdottir et al. (2010) and Marks and Allegrante (2005)......................................................... 31
Figure 2.12. Picker’s eight dimensions of person-centred care. Adapted from NRC Picker (2008).

Figure 5.1. Participant flow through the randomised controlled trial. Taken from Hinman et al. (2017b).
Chapter 1. Introduction and overview of chapters

Hip and knee osteoarthritis (OA) is highly prevalent and has a significant impact on both the individual sufferer and society. Current management guidelines advocate education and exercise for people with OA, regardless of age, comorbidity, pain severity, or disability. However, uptake of, and adherence to, exercise and physical activity is low amongst people with OA. Physiotherapists are a common provider of exercise therapy for people with OA, but there is evidence that many people experience difficulties accessing these services. For people who do access face-to-face physiotherapy services, care is often provided in a paternalistic manner that is not always person-centred nor supportive of positive changes in exercise behaviour. Thus, adherence to exercise and physical activity guidelines in people with knee OA is often sub-optimal and may reduce the beneficial effects that exercise and physical activity have on knee pain, physical function, and quality of life.

Telerehabilitation is the remote provision of care via telecommunication technologies and is a potential strategy by which the accessibility of services could be increased. There is some preliminary evidence that telerehabilitation via internet-enabled video conferencing, or via telephone consultations, is effective for people with knee OA. However, there are few such clinical services for people with OA currently available in Australia. Successful implementation of telerehabilitation services is dependent upon the perceived acceptability, effectiveness, and usefulness of the service, for both users and providers. Yet little is known about how people with OA and physiotherapists perceive telerehabilitation services for knee OA, and whether perceptions are influenced by experience with such services. Given that telerehabilitation service models are dependent
on effective communication with clinicians to encourage self-management and adherence to independent home-based exercise programs, it is important that physiotherapists are able to remotely provide person-centred care that supports positive behaviour change. However, no previous research has investigated whether training can change physiotherapists’ perceptions of person-centred practices and behaviour change support skills, nor evaluated their ability to implement such skills via telerehabilitation immediately following training.

To better understand potential barriers to implementing telerehabilitation, this thesis will investigate how people with OA, and physiotherapists, perceive such models of service delivery. It will also explore physiotherapists’ experiences completing a training program in behaviour change support and person-centred care in preparation for the delivery of exercise therapy via telephone as part of a large clinical trial. In addition, this thesis will assess physiotherapists’ fidelity to the person-centred practice and behaviour change skills immediately following training. Finally, this thesis will qualitatively explore the experiences of both people with knee OA, and physiotherapists, who received/delivered exercise therapy via telephone as part of the same clinical trial. Findings from this thesis will inform service providers about the acceptability of telerehabilitation amongst both people with OA and physiotherapists, as well as how clinicians should be appropriately trained to deliver such services, aiding future implementation of clinical services.

**Chapter 2** presents a review of the literature relevant to this thesis. This includes the problem of OA, core management strategies of education and exercise, barriers to exercise and physical activity, telehealth/telerehabilitation, and supporting exercise adherence and behaviour change.
Chapter 3 investigates the perceptions people with knee and/or hip OA have towards the delivery of exercise therapy by a physiotherapist over the telephone and via internet-mediated video consultations. This was done via a survey completed by 330 people across Australia, collecting data about the perceived safety, effectiveness, usefulness, and acceptability of care delivered via telephone and video. This study has been published in *Arthritis Care and Research*.

Chapter 4 investigates the perceptions that Australian physiotherapists have towards delivering exercise therapy via telephone or internet-mediated video consultations for people with knee and/or hip OA. This was done via a survey completed by 217 physiotherapists across Australia. This study has been published in *Arthritis Care and Research*.

Chapter 5 briefly describes the salient methods of the “Telecare” randomised controlled trial, which is integral to the methodology of the subsequent four chapters. The trial (still ongoing) aims to determine the effectiveness of incorporating exercise advice and behaviour change support by physiotherapists into an existing nurse-led musculoskeletal telephone service for adults with knee OA.

Chapter 6 explores the experiences of the eight physiotherapists involved in the Telecare trial who completed a training program in preparation for the delivery of exercise therapy via telephone. All physiotherapists completed a total of three days training in person-centred practice and behaviour change support, including a three-month practice phase. Semi-structured interviews were conducted with all physiotherapists, before and after
training, to explore their experiences and changes in perceptions from pre- to post-training. This study has been published in *Arthritis Care and Research*.

Chapter 7 examines the fidelity of physiotherapists to person-centred practice and behaviour change support skills taught during the training program described in Chapter 6. This study focuses on the ability of the physiotherapists to implement the behaviour change techniques and person-centred practice principles after two days of training. It is an audit study of 64 telephone consultations by the 8 physiotherapists during the three-month practice phase, including audit by an expert (the training facilitator) as well as a self-audit by the physiotherapists themselves. The manuscript describing this study is under review at *Trials*.

Chapter 8 explores the perceptions of a subset of people with knee OA who participated in the intervention arm of the Telecare trial, who received exercise management and behaviour change support from a physiotherapist via telephone. Semi-structured interviews were conducted with 20 participants, exploring their perceptions and interpretations of receiving telephone-delivered care. This study has been published in *Osteoarthritis and Cartilage*.

Chapter 9 explores how the Telecare physiotherapists perceived the delivery of exercise management and behaviour change support for people with knee OA via telephone prior to participating in the Telecare trial, and whether these perceptions differed after participation. This involved semi-structured interviews with all eight trial physiotherapists before the trial commenced, and again after 75% or more of their
allocated participants had completed their intervention. This manuscript describing this study is under review at *Arthritis Care and Research*.

**Chapter 10** summarises the main findings of this thesis and the implications of these findings for physiotherapy practice and for implementation of future telerehabilitation services. This chapter also summarises the strengths and limitations of the research, and directions for future research.
Chapter 2 Literature Review

2.1 Problem of osteoarthritis

Osteoarthritis (OA) of the knee and hip is highly prevalent and has a significant impact on sufferers, being the leading cause of functional limitation in older adults (Guccione et al., 1994; Murray et al., 2013). As such, the condition has a substantial socioeconomic burden, and is associated with enormous direct and indirect costs. As the population ages and rates of obesity increase, the prevalence of, and costs associated with, OA are projected to increase over the coming decades. This section outlines the definition, classification, prevalence, and incidence of OA, as well as the personal and socioeconomic impact of the condition.

2.1.1 Definition and classification

Osteoarthritis is not one defined disease but encompasses many disorders with a similar pathological pathway that result in structural and functional failure of a synovial joint (Conaghan & Nelson, 2012). The condition may affect all tissues within a joint, with loss of articular cartilage, alteration to subchondral bone, degradation of the menisci, synovial inflammatory response, and bone and cartilage osteophytes (Conaghan & Nelson, 2012; Nuki, 1999). The relative involvement of each of these structures varies from person to person and can also change over time within an individual case. The precise pathogenesis of the condition is largely unknown, but is often thought of as failed remodelling after initial injury, where the joint repair process, because of overwhelming trauma or compromised repair, fails and results in symptomatic OA (Conaghan & Nelson, 2012).
Diagnosis and classification of OA is typically based on radiographic findings, symptoms or clinical presentations, or self-report. Radiographic classifications of OA are based on signs present on radiographic images of the joint (Dahaghin et al., 2005), for example the presence and degree of joint space narrowing, osteophytosis, sclerosis, and joint deformity, irrespective of clinical symptoms (Kellgren & Lawrence, 1957). However, there is considerable discordance between radiographic findings and symptoms, and up to 50% of people with radiographic evidence of knee OA do not experience symptoms, and vice versa (Javaid et al., 2012; Lawrence et al., 1966). Accordingly, contemporary clinical guidelines do not recommend routine radiographs for a diagnosis of OA, but instead advocate diagnosis based on clinical presentation. The National Institute for Health & Care Excellence (NICE) in the UK recommends that OA be diagnosed clinically without investigations if a person is 45 years or over, reports joint pain during activity, and reports joint stiffness during the morning that lasts for less than 30 minutes (National Institute for Health and Care Excellence, 2014). Thus, studies within this thesis will use clinical criteria for selecting study participants, without need for radiographic screening.

2.1.2 Prevalence and incidence
Osteoarthritis is highly prevalent, affecting approximately 2.2 million Australians in 2015 (Ackerman et al., 2016). Depending on which definition of OA is used, precise estimates of incidence and prevalence vary (Arden & Nevitt, 2006; Duncan et al., 2006; Felson & Nevitt, 2004). Across all definitions, the prevalence of knee and hip OA is estimated to be approximately 24% and 11%, respectively, of the global adult population (Pereira et al., 2011). In knee OA, prevalence is higher in females than males, and peaks at around 50 years of age (Figure 2.1), while, in hip OA, prevalence is also higher in females than males but increases consistently with age (Cross et al., 2014). The lifetime risk of
developing symptomatic knee OA in the USA has been estimated at 40% for men and 47% for women, and 19% and 29% for hip OA, respectively (Murphy et al., 2008; Murphy et al., 2010). There is comparatively limited research investigating the incidence of hip and knee OA (Pereira et al., 2011). Data from Canada suggests an incidence of approximately 15 per 1000 people in the year 2000/2001, which increased 2.5-3.3% per year up to 2008/2009 (Rahman et al., 2014). More recent data from Spain suggests an incidence rate per 1000 people of 6.5 for knee and 2.1 for hip OA (Prieto-Alhambra et al., 2014).

![Figure 2.1 Prevalence of knee osteoarthritis by age, sex, year, and region. Taken from Cross et al. (2014).](image-url)
Although beyond the scope of this thesis, there are a number of factors that contribute towards the incidence and development of OA (Conaghan & Nelson, 2012; Suri et al., 2012) (Figure 2.2). Age is the most prominent risk factor (Blagojevic et al., 2010; Lawrence et al., 2008), with incidence of OA increasing dramatically in people over 65 years (Australian Bureau of Statistics, 2015b). Being female is also a risk factor, with symptomatic knee and hip OA being more prevalent in women (Busija et al., 2010). Obesity is a significant risk factor, where a 5-unit increase in body mass index has been associated with an 11% increase in the risk of developing hip OA, and a 35% increase in the risk of developing knee OA (Jiang et al., 2012). In Australia, people who were obese were found to be over seven times more likely to have knee OA than those who were of a healthy weight or underweight (Ackerman & Osborne, 2012). In addition, a recent longitudinal study found evidence for an earlier onset of OA amongst those who were obese, compared to those of a normal weight (Badley et al., 2017). The development of OA also varies by racial and ethnic groups and is linked to a variety of genetic factors (Suri et al., 2012).

Local biomechanical factors also contribute towards the incidence and development of OA (Suri et al., 2012). Previous joint injury can pose as a risk factor, causing joint instability, increased contact forces, or weakness of the surrounding musculature, leading to altered joint loading and compromising the structure and integrity of the joint (Roos, 2005). Significantly, self-reported knee injury is associated with an almost four times greater risk of developing knee OA (Blagojevic et al., 2010). Joint injury is the most modifiable risk factor for OA in men, and is second only to obesity in women (Felson et al., 2000). Other local risk factors include abnormalities in bone shape or contact between
joint surfaces (Agricola et al., 2013; Jacobsen & Sonne-Holm, 2005) and occupational and work exposures (Suri et al., 2012).

**Figure 2.2.** Risk factors for the development of osteoarthritis. Taken from Lohmander et al. (2007).

### 2.1.3 Personal and socioeconomic burden of the condition

Osteoarthritis has a significant personal and socioeconomic burden, incurring enormous direct and indirect costs, as well as intangible costs to the individual sufferer (Figure 2.3). Osteoarthritis ranks as the 11th highest contributor to global disability and the 38th highest for disability-adjusted life years (Cross et al., 2014), which provides an estimate of overall disease burden. Osteoarthritis also accounts for 2.2% of global years lived with disability, and 10% of all years lived with disability from musculoskeletal disorders (Murray et al., 2012; Vos et al., 2012). In addition, OA is the fastest increasing major health condition
in terms of years lived with disability rankings, with a 64% increase in years lived with disability from 1990 to 2010 (Institute for Health Metrics and Evaluation, 2012).

![Diagram showing the burden of osteoarthritis](image)

Figure 2.3. Direct, indirect, and intangible costs contributing to the personal and socioeconomic burden of osteoarthritis. Adapted from Hunter et al. (2014)

People with OA typically have joint pain, experience difficulties performing activities of daily living, and reduced quality of life (Conaghan & Nelson, 2012). Around 80% of people with OA experience limitations in movement, 25% cannot complete major activities of daily living, 11% need help with personal care, and 14% require help with routine activities (Guccione et al., 1994). In addition, OA is commonly associated with a number of comorbidities, such as obesity, hypertension, cardiovascular diseases, and diabetes (Caporali et al., 2005; Gabriel et al., 1999; Kadam et al., 2004; Schellevis et al., 1993; van Dijk et al., 2008). Even after adjusting for confounding factors such as age,
sex, and social class, people with OA are significantly more likely to have high levels of comorbidity than non-sufferers (Kadam et al., 2004). In addition, amongst people with OA, the prevalence of depressive symptoms is high (Sale et al., 2008).

Osteoarthritis is associated with a number of direct and indirect costs. Direct costs include nonpharmacological or pharmacological treatments, surgery, long-term care, and consultations with clinicians (Hunter et al., 2014). In Australia, the direct healthcare costs for OA in 2015 were over $2.1 billion, equating to approximately $970 for every person with the condition (Ackerman et al., 2016). Indirect costs include productivity losses, such as time off work, premature death, or early retirement (Hunter et al., 2014). In Australia, arthritis is the second most common cause of early retirement due to ill-health (Ackerman et al., 2016), which incurs significant losses in personal income, costs to the government in the form of welfare payments, losses in taxation revenue, and subsequent impacts on the economy (Ackerman et al., 2016). In 2015, arthritis incurred a loss of $1,753 million through lost labour force participation. Workforce absenteeism associated with OA also has a significant impact on productivity in other countries, including Canada and the USA (Li et al., 2006).

As the population ages and rates of obesity increase, the number of people with OA in Australia is projected to increase by approximately 41% by the year 2030, from 2.2 million to almost 3.1 million (Ackerman et al., 2016) (Figure 2.4). This will further escalate healthcare costs and create a major burden on healthcare systems. In fact, healthcare costs for OA are projected to increase by 39% from 2016 to 2030 (Ackerman et al., 2016), and indirect costs are projected to increase by 61% over the same time period (Ackerman et al., 2016). In addition, welfare payments are projected to increase by 23%
and losses to annual taxation revenue to increase by 44% (Ackerman et al., 2016). As such, cost-effective treatments that can reduce pain, improve function, and improve quality of life are urgently needed.

![Figure 2.4. Projected prevalence of osteoarthritis in Australia. Taken from Ackerman et al. (2016).](image)

### 2.2 Management of osteoarthritis

As there is currently no cure for OA, the condition is typically managed using both non-surgical and surgical methods. Non-surgical management of OA primarily aims to reduce joint pain and improve physical function and overall quality of life. The most recent clinical guidelines recommend that all people with OA should be offered three core treatments when they first present: education and access to information, exercise and physical activity, and weight loss if appropriate (National Institute for Health and Care Excellence, 2014). Pharmacological modalities (such as paracetamol and nonsteroidal anti-inflammatory drugs) are recommended as adjunctive treatments, though increasing
concern about the effectiveness and safety of common painkillers (Machado et al., 2015) means that non-pharmacological strategies are considered the mainstay of management. Other adjunctive treatments include, amongst others, thermotherapy, supports and braces, shock absorbing shoes or insoles, or manual therapy (Figure 2.5). An individualised approach to management is recommend (National Institute for Health and Care Excellence, 2014), whereby treatments are personalised to each individual by, for example, tailoring treatment according to individual preferences or expectations. It is also recommended that treatment involves an integrated package of care rather than single treatments alone, such as interventions combining education with exercise and/or weight loss (National Institute for Health and Care Excellence, 2014). Importantly, a biopsychosocial approach is recommended, which involves consideration of psychological factors (e.g. motivation, mood, beliefs) and well as physical factors (e.g. pain, fatigue, strength, weight) (National Institute for Health and Care Excellence, 2014). These recommendations reflect those of all other current clinical guidelines (Fernandes et al., 2013; Hochberg et al., 2012; McAlindon et al., 2015).
Figure 2.5. National Institute for Health and Clinical Excellence (NICE) osteoarthritis management recommendations. Taken from Conaghan et al. (2008).

NSAIDS: nonsteroidal anti-inflammatory drugs

Clinical guidelines recommend that surgical management of OA only be considered for severe symptomatic cases, after conservative management approaches have been trialled (National Institute for Health and Care Excellence, 2014; RACGP Osteoarthritis Working Group, 2009). Arthroscopic surgery is no longer recommended because of its poor association with long-term improvements in pain or function, as well as the potential for short-term harms, long recovery periods, and extended time off work after surgery (Siemieniuk et al., 2017). Total joint replacement surgery is associated with reductions in pain and disability (Skou et al., 2015), though there are a number of risks associated with the procedure, and not all patients experience optimal outcomes (Carr et al., 2012). Joint replacement surgery is also expensive, with in-hospital costs being estimated at over $1.2
billion in Australia in 2008-09 (Ackerman et al., 2016). Despite recommendations, surgical referral rates from Australian general practitioners are high (Brand et al., 2014) and in 2017, the number of total hip and knee replacements, for which OA is the primary driver, had increased by 94% and 112%, respectively, since 2003 (National Joint Replacement Registry, 2017). Better implementation of non-surgical management interventions for people with OA may result in substantial cost savings. In fact, the savings associated with delaying or avoiding joint surgery in 2015 in Australia was estimated to be more than $170 million, projected to increase to over $233 million in 2030 (Ackerman et al., 2016). As the focus of this thesis is on the delivery of exercise management by physiotherapists, and incorporating education, the next sections will now discuss the role of education and exercise in managing OA in more detail.

2.2.1 Education

Patient and caregiver education is recommended as a core component of management for not only OA, but for all chronic diseases (Bodenheimer et al., 2002; Warsi et al., 2004). In fact, lack of knowledge about arthritis has been linked to depression, anxiety, lower quality of life, and poor coping skills in people with chronic arthritis (Lorig et al., 1993). Important components of patient education typically include offering verbal and written information to enhance understanding of OA and how it can be managed. Education should also help to counter common misconceptions about OA (National Institute for Health and Care Excellence, 2014). For example, there is evidence that people with OA believe painful joints are an inevitable part of ageing and that their symptoms will be permanent (Appelt et al., 2007; Turner et al., 2007), and older adults have a lot of uncertainty about the role of non-surgical management strategies for OA, particularly with regards to the purpose, safety, and effectiveness of exercise (Holden et al., 2012).
Chapter 2. Literature review

Given that OA is a chronic condition with no cure, another key component of education includes equipping people with the skills and knowledge to take an active role in the self-management of their condition. This might include providing individualised treatment plans and providing regular contact to promote self-management, as well as assisting patients to incorporate these self-management interventions into their everyday life (Nelson et al., 2014).

There is evidence that education interventions for people with hip and/or knee OA are associated with small, but significant, improvements in pain and physical function (Chodosh et al., 2005; Zhang et al., 2010). For example, a systematic review found that interventions involving self-management, education, and information (e.g. education about OA, advice about exercise and weight loss) were associated with small but significant improvements in pain (effect size: 0.06) and function (0.06) compared to usual care (e.g. waiting list) in people with hip and knee OA (Zhang et al., 2010). Participation in self-management programs (e.g. including education to dispel inappropriate health beliefs, alter behaviour, and encourage regular physical activity) has also been associated with reduced costs and reduced number of medical consultations (de Jong et al., 2008; Hurley et al., 2012; Wu et al., 2011). A Cochrane review of 29 studies found low to moderate quality evidence to indicate that self-management education programs result in no or small benefits in self-management skills, pain, and function in people with OA, compared to usual care (Kroon et al., 2014). There is also emerging evidence that internet-based educational programs are acceptable and effective for people with OA, improving health status, access to care, and communication between patients and healthcare professionals (Pietrzak et al., 2013). Although the direct benefits of education on pain and function are only small, the indirect benefits on patient knowledge, self-efficacy to engage
in treatment recommendations, and more realistic expectations of treatment outcomes, means that it is an important and fundamental component of OA care.

2.2.2  Exercise and physical activity

All current clinical guidelines advocate regular ongoing exercise as a core treatment for knee and/or hip OA, irrespective of age, comorbidity, pain severity, or disability (Fernandes et al., 2013; Hochberg et al., 2012; McAlindon et al., 2015; National Institute for Health and Care Excellence, 2014). Improving muscle strength is important in people with OA, given that muscle weakness is common in afflicted individuals and often evident in muscles of the local joint. For example, people with knee OA demonstrate strength deficits ranging from 16% (hip extensors) to 27% (hip external rotators) compared to asymptomatic controls, even after accounting for differences in sex and age (Hinman et al., 2010). As such, improving muscle strength may reduce knee forces, reduce pain, and improve physical function (Bennell et al., 2008; Dekker, 2013).

In knee OA, the benefits of strengthening and aerobic exercise in the short term are well established, with similar efficacy to pharmacological management methods, but with fewer adverse effects (Fransen et al., 2015). The most recent Cochrane review of exercise for knee OA included 54 randomised clinical trials and found high-quality evidence that, compared to a non-exercise control, land-based therapeutic exercise reduced pain (standardized mean difference -0.49, 95% confidence interval -0.39 to -0.59) (Figure 2.6), moderate-quality evidence that it improved function (-0.52, -0.39 to -0.64) (Figure 2.7), and high-quality evidence that it improved quality of life (0.28, 0.15 to 0.40) (Figure 2.8) (Fransen et al., 2015). There was also evidence that these changes were sustained in the long term (i.e. two to six months post-treatment). Most trials in the review involved
muscle strengthening exercises or a combination of strength and aerobic exercise (e.g. walking), with others focussing on Tai Chi. Subgroup analysis found no evidence of differences in treatment effects between each type of exercise (Figure 2.9), though there was significant heterogeneity between different strengthening programs. There is considerably less evidence available to support the effectiveness of exercise for hip OA, but the most recent Cochrane review concluded that land-based exercise programs reduced pain and improved physical function (Fransen et al., 2014).
Figure 2.6. Forest plot of changes in pain following exercise for knee osteoarthritis.

Taken from Fransen et al. (2015).
Chapter 2. Literature review

### 2.1.1 Changes scores

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Exercise Mean</th>
<th>SD Total</th>
<th>Control Mean</th>
<th>SD Total</th>
<th>Weight</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winer 1972</td>
<td>-0.09</td>
<td>2.5</td>
<td>49</td>
<td>0.33</td>
<td>2.5</td>
<td>19</td>
<td>2.2%</td>
</tr>
<tr>
<td>Kowal 1992</td>
<td>-2.2</td>
<td>2.72</td>
<td>47</td>
<td>0.24</td>
<td>2.49</td>
<td>46</td>
<td>2.5%</td>
</tr>
<tr>
<td>Bachma 1996</td>
<td>-3.66</td>
<td>3.3</td>
<td>10</td>
<td>-0.42</td>
<td>3.5</td>
<td>16</td>
<td>1.2%</td>
</tr>
<tr>
<td>Backes 1997</td>
<td>-2.92</td>
<td>7.70</td>
<td>15</td>
<td>-2.44</td>
<td>0.17</td>
<td>15</td>
<td>1.6%</td>
</tr>
<tr>
<td>von Dierck 1998</td>
<td>-1.3</td>
<td>5.7</td>
<td>54</td>
<td>-0.5</td>
<td>5.5</td>
<td>59</td>
<td>2.7%</td>
</tr>
<tr>
<td>Riggio 1998</td>
<td>-3</td>
<td>3.3</td>
<td>11</td>
<td>-2</td>
<td>5.3</td>
<td>12</td>
<td>1.4%</td>
</tr>
<tr>
<td>Paton et al. 1999</td>
<td>-1.5</td>
<td>2.4</td>
<td>59</td>
<td>-0.34</td>
<td>2.67</td>
<td>66</td>
<td>2.8%</td>
</tr>
<tr>
<td>Maier 1995</td>
<td>-1.09</td>
<td>2.98</td>
<td>230</td>
<td>0.45</td>
<td>2.56</td>
<td>240</td>
<td>3.4%</td>
</tr>
<tr>
<td>Hopman-Rock 2003</td>
<td>-0.6</td>
<td>4.6</td>
<td>37</td>
<td>-1.7</td>
<td>5.2</td>
<td>34</td>
<td>2.6%</td>
</tr>
<tr>
<td>Doyle 2001</td>
<td>-402.51</td>
<td>3.88</td>
<td>33</td>
<td>-0.18</td>
<td>303.8</td>
<td>36</td>
<td>2.3%</td>
</tr>
<tr>
<td>Kuiper 2007</td>
<td>-2.13</td>
<td>2.89</td>
<td>192</td>
<td>-0.29</td>
<td>1.82</td>
<td>203</td>
<td>2.3%</td>
</tr>
<tr>
<td>Fransen 2007</td>
<td>7.7</td>
<td>19.9</td>
<td>63</td>
<td>0.8</td>
<td>20.5</td>
<td>43</td>
<td>2.7%</td>
</tr>
<tr>
<td>Toop 2002</td>
<td>-4.16</td>
<td>10.6</td>
<td>67</td>
<td>0.17</td>
<td>10.8</td>
<td>35</td>
<td>2.6%</td>
</tr>
<tr>
<td>Olt 2006</td>
<td>-12.6</td>
<td>4.1</td>
<td>17</td>
<td>1</td>
<td>2.5</td>
<td>6</td>
<td>0.6%</td>
</tr>
<tr>
<td>Reijnders 2008</td>
<td>-2.91</td>
<td>17.9</td>
<td>61</td>
<td>2.1</td>
<td>8.1</td>
<td>26</td>
<td>1.9%</td>
</tr>
<tr>
<td>Seng 2003</td>
<td>-10.14</td>
<td>12</td>
<td>22</td>
<td>-1.33</td>
<td>10.8</td>
<td>21</td>
<td>1.8%</td>
</tr>
<tr>
<td>Huang 2003</td>
<td>-2</td>
<td>69</td>
<td>79</td>
<td>-0.4</td>
<td>1.7</td>
<td>33</td>
<td>2.6%</td>
</tr>
<tr>
<td>Huang 2005</td>
<td>-1.15</td>
<td>1.4</td>
<td>30</td>
<td>-0.5</td>
<td>1.7</td>
<td>32</td>
<td>2.2%</td>
</tr>
<tr>
<td>Bannister 2005</td>
<td>-7.8</td>
<td>8.7</td>
<td>73</td>
<td>-8.2</td>
<td>10</td>
<td>67</td>
<td>2.9%</td>
</tr>
<tr>
<td>Thorstenson 2005</td>
<td>-2</td>
<td>12</td>
<td>30</td>
<td>0.8</td>
<td>18</td>
<td>31</td>
<td>2.3%</td>
</tr>
<tr>
<td>Huong 2010</td>
<td>-4.78</td>
<td>10.6</td>
<td>66</td>
<td>0.8</td>
<td>9.6</td>
<td>91</td>
<td>3.0%</td>
</tr>
<tr>
<td>Fransen 2013</td>
<td>-5.04</td>
<td>10.25</td>
<td>41</td>
<td>2.97</td>
<td>9.96</td>
<td>36</td>
<td>2.0%</td>
</tr>
<tr>
<td>Lam 2008</td>
<td>-6.5</td>
<td>10.6</td>
<td>53</td>
<td>-2.6</td>
<td>10.9</td>
<td>54</td>
<td>2.7%</td>
</tr>
<tr>
<td>Lee 2007</td>
<td>-5.4</td>
<td>14.4</td>
<td>29</td>
<td>-2.7</td>
<td>10.8</td>
<td>15</td>
<td>1.9%</td>
</tr>
<tr>
<td>Eezenhout 2016</td>
<td>-9.07</td>
<td>7.7</td>
<td>46</td>
<td>-1.8</td>
<td>7.8</td>
<td>44</td>
<td>2.5%</td>
</tr>
<tr>
<td>He 2012</td>
<td>3.2</td>
<td>3.4</td>
<td>114</td>
<td>1.5</td>
<td>20.3</td>
<td>91</td>
<td>3.1%</td>
</tr>
<tr>
<td>Chang 2012</td>
<td>-10.7</td>
<td>5.8</td>
<td>24</td>
<td>-4.3</td>
<td>4.4</td>
<td>17</td>
<td>1.7%</td>
</tr>
<tr>
<td>Dejaco 2012</td>
<td>-8.0</td>
<td>7.4</td>
<td>71</td>
<td>0.8</td>
<td>45.3</td>
<td>63</td>
<td>1.4%</td>
</tr>
<tr>
<td>Subtotal (95%)</td>
<td>1240</td>
<td>1013</td>
<td>62.0%</td>
<td>0.47 [0.63, 0.31]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity tests:
- Tau² = 0.12; Chi² = 54.95, df = 27 (P < 0.0001); I² = 65%
- Test for overall effect: Z = 0.78 (P < 0.0001)

---

**Figure 2.7.** Forest plot of changes in physical function after exercise for knee osteoarthritis. Taken from Fransen et al. (2015).
2. Literature review

Figure 2.8. Forest plot of changes in quality of life after exercise for knee osteoarthritis. Taken from Fransen et al. (2015).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Exercise Mean</th>
<th>Exercise SD</th>
<th>Control Mean</th>
<th>Control SD</th>
<th>Weight</th>
<th>IV, Random, 95% CI</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merlet 1996</td>
<td>-1.7</td>
<td>1.3</td>
<td>28</td>
<td>-2.4</td>
<td>1.7</td>
<td>26</td>
<td>8.3%</td>
</tr>
<tr>
<td>Fransen 2001</td>
<td>2</td>
<td>9.4</td>
<td>58</td>
<td>-0.7</td>
<td>3.7</td>
<td>45</td>
<td>10.7%</td>
</tr>
<tr>
<td>Keefe 2004</td>
<td>0.38</td>
<td>1.22</td>
<td>16</td>
<td>0.05</td>
<td>0.33</td>
<td>16</td>
<td>3.2%</td>
</tr>
<tr>
<td>Bennell 2005</td>
<td>0.5</td>
<td>0.13</td>
<td>73</td>
<td>0.51</td>
<td>0.17</td>
<td>67</td>
<td>13.5%</td>
</tr>
<tr>
<td>Thoresen 2006</td>
<td>4</td>
<td>1.3</td>
<td>30</td>
<td>-0.7</td>
<td>14</td>
<td>31</td>
<td>5.8%</td>
</tr>
<tr>
<td>Hsu 2006</td>
<td>0.14</td>
<td>2</td>
<td>93</td>
<td>-0.26</td>
<td>2</td>
<td>99</td>
<td>17.5%</td>
</tr>
<tr>
<td>Lao 2006</td>
<td>19.2</td>
<td>15.9</td>
<td>28</td>
<td>9.1</td>
<td>10.3</td>
<td>16</td>
<td>3.6%</td>
</tr>
<tr>
<td>Kao 2012</td>
<td>2.1</td>
<td>9.3</td>
<td>114</td>
<td>-5.33</td>
<td>7.9</td>
<td>91</td>
<td>19.4%</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>466</td>
<td>382</td>
<td>78.8%</td>
<td>0.27 [0.13, 0.42]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.3.2 End of treatment scores

Fransen 2007 49.61 8.93 41 47.6 8.2 36 7.4% 0.234 [0.22, 0.23] 2007
Lund 2008 45.8 12.5 26 43.1 11.5 27 5.0% 0.084 [0.45, 0.66] 2008
Wang 2011 74 11 26 57 13 26 4.6% 0.57 [0.32, 1.12] 2011
Bruce-Brand 2012 66 64 20 30 10 86 27 77 6 1.4% 0.074 [0.05, 0.10] 2012
SalenioiH 2012 50.2 17.5 13 48.7 22.6 16 2.6% 0.594 [0.17, 1.02] 2012
Subtotal (95% CI) 410 115 21.2% 0.30 [0.04, 0.37] 2012

Figure 2.9. Effectiveness of different types of exercise for improving pain and physical function amongst people with knee osteoarthritis. Taken from Fransen et al. (2015).
Descriptions of exercise dosage, including the frequency (sessions per week), duration (length), volume (repetitions or sets per session), or intensity (effort) of the exercise program, vary greatly within the literature. Both the most recent Cochrane Review (Fransen et al., 2015), as well as a previous Cochrane review (Regnaux et al., 2012) comparing low versus high intensity exercise for hip or knee OA were unable to reach conclusions regarding which exercise dosages are most effective for improving knee OA symptoms. Another systematic review of the impact of exercise dose on pain and disability in knee OA included 48 trials and concluded that exercise programs should be carried out three times per week, regardless of radiographic severity or baseline pain (Juhl et al., 2014). However, it is important to note that prescribed dosage may not necessarily translate into actual dosage completed, and exercise dose is scarcely reported in the literature.

Advice to increase physical activity levels is also important, given that most people with knee OA do not meet physical activity guideline recommendations (Wallis et al., 2013). For example, a systematic review of 21 studies found that only 13-41% of people with knee OA met recommendations for ≥150 minutes of moderate to vigorous physical activity per week, and only 19% met recommendations for ≥10,000 steps per day (Wallis et al., 2013). Findings were similar for people with hip OA. Research has demonstrated that people with knee OA who are less sedentary have better physical function, independent of time spent doing moderate to vigorous physical activity (Dunlop et al., 2015; Lee et al., 2015). In addition, there is evidence that a consistent graded relationship exists between level of physical activity and better functional performance in adults with knee OA (Dunlop et al., 2011) (Figure 2.10). Greater physical activity and participation
in sports or recreational activities is also associated with improved/high physical function over one year (Dunlop et al., 2010).

Figure 2.10. An example of the graded relationship between physical activity and physical function in people with osteoarthritis. Taken from Dunlop et al. (2011).

Cross-sectional cumulative percentage of patients in each physical activity quartile with the indicated gait speed at baseline. Patients in group 1 were least active, and those in group 4 were the most active. N = 2,589. Cumulative frequency curves of functional performance displayed the proportion in each physical activity group with performance below the specific value on the horizontal axis.

The method of delivering an exercise or physical activity program to people with OA is also important. This may involve individual one-on-one supervision by a clinician or exercise provider, participation in class-based or group programs, and/or unsupervised home-based programs (Bennell et al., 2014). There is evidence that all delivery modes
can lead to improvements in pain and physical function, but that individual programs are associated with the greatest improvements, followed by class-based programs, and then home-based programs (Fransen et al., 2015). In clinical practice, most exercise programs typically involve a combination of delivery modes (e.g. individual one-on-one sessions combined with unsupervised home-based programs). In order to optimise the beneficial effects of exercise participation on OA symptoms, it is recommended that individual patient preferences are taken into account when deciding on the most appropriate mode of exercise delivery, and that most people with OA receive some form of ongoing monitoring (Fransen et al., 2015).

2.3 Barriers to exercise and physical activity participation

Despite recommendations, participation in exercise and/or physical activity programs amongst people with OA is problematic both in Australia and overseas (Hinman et al., 2015; Jordan et al., 2010; Mitchell & Hurley, 2008). One Australian survey found that, amongst 591 people with hip or knee OA, only 7-18% were currently completing muscle strengthening exercises, attending an aerobic fitness class, or using hydrotherapy, and 56-79% had never used any of these exercise interventions (Hinman et al., 2015). A UK survey of 1,276 adults with knee pain found that only 40% had used exercise in the past month to manage their knee pain, and only 44% were sufficiently active to meet physical activity recommendations (Holden et al., 2012).

To maximise the clinical benefits of exercise, it is essential that people with OA adhere to their exercise or physical activity program over the long-term. However, long-term adherence to prescribed exercise programs is problematic in OA populations (Pisters et al., 2010a). Exercise adherence, defined as the extent to which a person’s behaviour
corresponds with agreed recommendations (World Health Organisation, 2003), declines significantly over time amongst people with OA (Fransen et al., 2015; Fransen et al., 2009). Estimates from clinical trials suggest between 5-50% of participants with OA do not adhere to exercise in the long-term (Lin et al., 2004; van Gool et al., 2006), and actual non-adherence rates amongst people in the community may be even higher. Poor adherence to exercise has been associated with poorer treatment outcomes with respect to pain, function, physical performance and perceived improvements (Pisters et al., 2010b), and the beneficial effects of exercise have been found to only last as long as the patient continues undertaking the exercises (Pisters et al., 2007; Van Baar et al., 2001).

There are a range of extrinsic and intrinsic barriers to the uptake and maintenance of exercise amongst people with OA, many of which are beyond the scope of this thesis. A recent scoping review (Dobson et al., 2016) mapped common barriers and facilitators to the Theoretical Domains Framework, which integrates behaviour change theories into a single overarching framework and comprises domains that influence behaviour and behaviour change. The authors of that review extracted modifiable barriers and facilitators to exercise from 23 studies and mapped each to the 14 domains of the Theoretical Domains Framework. They found that barriers to exercise participation amongst people with hip and/or knee OA most commonly related to the environmental context and lack of resources available, as well as to incorrect beliefs about consequences of exercise and inaccurate perceptions about personal capabilities to participate in exercise (Dobson et al., 2016) (Table 2.1).
Table 2.1 Common identified modifiable barriers and facilitators to exercise participation amongst people with OA. Adapted from Dobson et al. (2016).

<table>
<thead>
<tr>
<th>Domain of the Theoretical Domains Framework</th>
<th>Barriers</th>
<th>Facilitators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental context and lack of resources available</td>
<td>-Use of a walking aid</td>
<td>-Online program</td>
</tr>
<tr>
<td></td>
<td>-Bad weather conditions</td>
<td>-Printed instructions for exercises</td>
</tr>
<tr>
<td></td>
<td>-Gym-based exercise</td>
<td>-Shoes with shock absorption</td>
</tr>
<tr>
<td></td>
<td>-Having to go down hills or stairs during walking program</td>
<td>-Easy access to facilities</td>
</tr>
<tr>
<td></td>
<td>-Rigid program</td>
<td>-Pedometer use</td>
</tr>
<tr>
<td></td>
<td>-Lack of access to facilities</td>
<td>-Gym-based exercises</td>
</tr>
<tr>
<td></td>
<td>-Concerns about safety</td>
<td>-Ability to accommodate in everyday life</td>
</tr>
<tr>
<td></td>
<td>-Other commitments</td>
<td>-Good weather conditions</td>
</tr>
<tr>
<td></td>
<td>-Conflict with routines</td>
<td>-No financial trouble</td>
</tr>
<tr>
<td></td>
<td>-Lack of time</td>
<td>- Easily accessible exercise classes</td>
</tr>
<tr>
<td></td>
<td>-Classes not easily available</td>
<td>-Ease of transportation</td>
</tr>
<tr>
<td></td>
<td>-Transport difficulties</td>
<td>-Finding suitable exercise</td>
</tr>
<tr>
<td></td>
<td>-Cost of exercising</td>
<td>-Doctor gave gym referral</td>
</tr>
<tr>
<td></td>
<td>-Unable to find suitable exercise</td>
<td>-Exercise as part of organised event</td>
</tr>
<tr>
<td></td>
<td>-Cold changing room temperature</td>
<td>-Supervision one-on-one</td>
</tr>
<tr>
<td></td>
<td>-Pool temperature too hot or too cold</td>
<td>-Physiotherapists care</td>
</tr>
<tr>
<td></td>
<td>-Difficult to find parking at the pool</td>
<td>-Booster sessions</td>
</tr>
<tr>
<td></td>
<td>-Poorly organised instructor</td>
<td>-Physiotherapist guidance of program</td>
</tr>
</tbody>
</table>

| Beliefs about consequences | -Beliefs about disease | -Perceived benefits of exercising |
| | -Beliefs about wear and tear | -Belief that exercise is good for health |
| | -Beliefs about worsening symptoms | -Positive outcome expectations |
| | -Unrealistic expectations of exercise | -Pain limiting land-based activities, causing to try pool exercise |
| | -Belief that exercise has limited effectiveness | |
| | -Concern over exercise (causing) pain | |
| | -Fear of jarring knee | |
| | -Fear of flare-ups | |
| | -Fear of damaging knee further | |

| Beliefs about capabilities | -Beliefs about limitations due to disability | -Low level of self-reported physical limitations |
| | -Knee pain limited perceived ability to exercise | -Perception of being physically active |
| | -Excess weight leading to perceived inability to exercise | -Belief that you are taking control of own disability |
| | -Beliefs about severity of symptoms | -Lower body mass index |
| | -Stiffness and fatigue limiting perceived ability to exercise | -Few or no comorbidities |
| | -Other joint pain | -Joint stiffness |
| | -Hypertension | |
| | -Higher number of comorbidities | |

2.3.1 Accessibility of care

Many barriers to exercise participation amongst people with OA relate to the inaccessibility of services (e.g. lack of access to facilities/healthcare, transport difficulties) (Dobson et al., 2016). People with knee OA who have difficulty accessing
appropriate health professionals (e.g. transport issues or difficulties scheduling appointments) often delay seeking care (Prasanna et al., 2013), possibly to the detriment of their OA. Poor access to care and information has also been associated with increased feelings of being unable to cope with OA (Arthritis Australia, 2012).

In Australia, physiotherapists are one of the most common providers of exercise management for people with OA. In fact, of all allied healthcare professionals in Australia, general practitioners most commonly refer their patients with OA to physiotherapists (Australian Institute of Health and Welfare, 2010). However, although people with OA believe that access to physiotherapy and exercise therapy is important (Papandony et al., 2017), a range of system barriers (such as lack of service provision, inconvenient appointment times and venue location) contribute to poor uptake (Papandony et al., 2017). For many people with OA, transport issues or geographic location may limit access to physiotherapy services, particularly in regional or rural areas where services may be limited or non-existent (Ackerman & Busija, 2012; Arthritis Australia, 2012; Hagglund et al., 2005). Service accessibility issues are particularly relevant in Australia where the population is wide-spread and where, compared to other health professionals, physiotherapists are described as a ‘metropolitan-based workforce’ (HealthWorkforce Australia, 2014). For example, in 2012, the number of employed physiotherapists per 100,000 people throughout Australia was 101 in major cities, compared to just 38 in very remote areas (HealthWorkforce Australia, 2014). Developing models of physiotherapy service delivery that are accessible to the broader population may therefore improve exercise uptake and adherence amongst Australians with OA.
2.3.2 Clinician behaviour may negatively impact patient adherence to exercise

There is evidence that many clinicians do not practice in ways that encourage exercise participation (Runciman et al., 2012). A recent study investigated management of OA by Australian general practitioners and found that prescription of non-pharmacological management strategies is low compared to pharmacological management methods (Brand et al., 2014), contradicting management guidelines. Amongst people with hip and knee OA who had been referred for orthopaedic management in Australia, only 30% had consulted a physiotherapist prior to referral, and even smaller proportions had undertaken supervised exercise (Haskins et al., 2014). A survey of people with knee pain in the UK revealed that, of the 611 respondents, only 37% had previously been given advice to exercise for their knee OA (Holden et al., 2012).

Many clinicians appear to lack the appropriate knowledge about the benefits of exercise for people with OA. Another UK survey of 2,000 physiotherapists found that only 55% largely or totally agreed that knee pain could be improved by exercise and that physiotherapists should prescribe strengthening exercise for every patient with knee OA (Holden et al., 2009). In addition, only 36% agreed that it was important people with knee OA increase their overall physical activity levels. Interviews with a sub-sample of those survey respondents (n = 24) revealed that physiotherapists believed OA was a chronic degenerative condition that would worsen over time, with the only cure being surgery (Holden et al., 2009). Similarly, a systematic review of general practitioner’s attitudes, beliefs, and behaviours towards exercise for knee pain found that up to 29% believed that rest was the best management approach (Cottrell et al., 2010). As such, it is likely that many people with OA are often not receiving appropriate exercise advice or recommendations from clinicians.
There is also evidence that many clinicians do not practice in ways which support long-term adherence to exercise or consider principles of behaviour change. A survey of 1,152 physiotherapists in the UK found that only 12% would recommend use of an exercise diary and only 34% would offer follow-up after discharge (Holden et al., 2008). That same survey found that 85% believed that it was the patient’s own responsibility to continue doing their exercise program, and fewer than 45% believed that the patient was the best person to decide whether to do their exercise at home or in a group setting (Holden et al., 2009). Interviews with a sub-sample of those physiotherapists (n = 24) revealed that many adopt a paternalistic approach to management, in which the clinician decides on the treatment approach and the patient is expected to comply, despite not being involved in the decision-making process (Holden et al., 2009). Similarly, a survey of 357 physiotherapists in Germany found that about two thirds reported using a paternalistic approach in routine care (Topp et al., 2017). Physiotherapists in Australia also tend to adopt a ‘practitioner-centred’ model of communication in private practice (Hiller et al., 2015), which includes closed and direct questioning, a focus on biological processes, and a relationship which is controlled by the practitioner’s own agenda (McCollum & Pincus, 2009; Roter et al., 1997). This is despite the fact that exercise adherence is greater when physiotherapists adopt autonomy-supportive behaviours rather than paternalistic approaches (Chan et al., 2009).

In summary, there are a range of individual barriers to exercise participation amongst people with OA, including barriers relating to the environmental context, beliefs about consequences, and beliefs about capabilities. In addition, it is likely that many clinicians do not practice in ways which encourage long-term behaviour change or adherence to
prescribed exercise. To address barriers relating to the accessibility of healthcare, this thesis will focus on remote models of physiotherapy service delivery (Figure 2.11) (described in Section 2.4). To address barriers relating to lack of motivation, self-efficacy, knowledge, and attitudes and beliefs about exercise, this thesis will focus on the provision of behaviour change support and person-centred care by clinicians (described in Section 2.5).

![Diagram showing barriers to exercise participation and solutions](image)

**Figure 2.11. Overview of barriers to exercise participation amongst people with osteoarthritis that are the focus of this thesis. Adapted from Petursdottir et al. (2010) and Marks and Allegrante (2005).**

### 2.4 Telehealth/Telerehabilitation

One way of improving access to healthcare services is by delivering care remotely via technology, known as ‘telehealth’, ‘telerehabilitation’ or ‘telemedicine’. The World Health Organisation defines telehealth as “the use of information communication
technology to improve patient outcomes by increasing access to care and medical information” (pg.8) (World Health Organisation, 2010). The term ‘telehealth’ can encompass a range of different services, including practice management software, electronic medical records, online education systems, smart phone applications, and remote consultations with a healthcare professional. Many of these telehealth services are beyond the scope of this thesis, and thus this thesis will focus on the use of telehealth for remote consultations with healthcare providers.

In this digital age, telehealth offers a potentially accessible model of healthcare delivery for most people in Western countries. Telehealth may address the needs of people who are unable or unwilling to attend a physiotherapy clinic in person, such as those who have limited time, live in a remote area, lack transportation or other resources, or have disabling conditions that make it difficult to attend clinicians’ consulting rooms (Rini et al., 2014). In addition to its accessibility, telehealth can save time and costs associated with travelling to or from clinics, offer better options for continuity of care, flexibility of consultation timing, and reduce lost work time associated with attending clinics in-person (Russell, 2009). Telehealth is thought to be a particularly attractive option for people who live in rural and remote areas who may live long distances from healthcare services. However, telehealth may also appeal to those who live in metropolitan areas and experience transport or parking difficulties or otherwise lack the time to attend clinics in-person or are physically disabled such that accessing a clinic in-person is difficult.

Over the past few decades, interest in telehealth has been growing. Overseas, the size of the digital health market was estimated at $60.8 billion US dollars in 2013, which was expected to grow to $233.3 billion by 2020 (Deloitte, 2016; N. et al., 2016). Telehealth
also reportedly experienced a 315% growth from 2013-2014 (Rock Health, 2015). In the literature, telehealth interventions are most commonly used for patients with chronic conditions (e.g. cardiac or pulmonary diseases) or elderly patients (Koch, 2006) because of the focus on long-term self-management and the population’s reduced ability to travel. A review of 80 existing systematic reviews examining the use of telehealth within any patient condition found mixed evidence for its effectiveness, with 21 studies reporting that telehealth was effective (i.e. lead to improvements in therapeutic outcomes or increased efficiencies in health services), 18 reporting promising, but incomplete, evidence for its effectiveness, and the remaining 21 studies reporting that the evidence was limited and inconsistent (Ekeland et al., 2010). That review also found evidence of high patient satisfaction with telehealth. However, the authors also noted that the telehealth field was rapidly evolving as new technologies emerge, and that it was therefore difficult to make firm conclusions about the overall effectiveness of these services. In addition, there was significant heterogeneity in technology used to deliver services, patient populations and type of healthcare professionals delivering care.

Amongst people with rheumatic diseases (i.e. rheumatoid arthritis, systemic sclerosis, fibromyalgia, OA, and juvenile idiopathic arthritis), a recent systematic review of 23 studies concluded that telehealth (most commonly delivered by a rheumatologist) was an appropriate way to remotely deliver treatment (i.e. exercise and self-management programs) and monitor a patient’s condition (Piga et al., 2017). However, many studies had a small sample size and heterogeneity in intervention design and outcomes prevented meta-analysis. Sixteen of the 23 studies (70%) in that review were published in the last five years, indicating that interest in telehealth for rheumatic diseases, like OA, is growing (Ward et al., 2016).
In the literature, many studies have utilised sophisticated telehealth technologies that include, for example, sensor feedback technology (e.g. accelerometers to detect movement and provide feedback to a clinician in a remote location) or virtual environments (e.g. to assist learning of new motor skills) that are incorporated into videoconferencing software (Russell, 2007). Given their complexity, these types of services may not be easily accessible to a wide range of people within the community. Alternatively, services utilising accessible, user-friendly, and cheap technologies (e.g. telephone or internet-mediated videoconferencing services) have the potential to be easily implemented nation-wide. In Australia in 2014-15, 86% of all households had internet access, and most households (94%) accessed the internet through a desktop or laptop computer (Australian Bureau of Statistics, 2015a). Similarly, in 2015 most households in the US had a desktop or laptop computer (78%) and a broadband internet subscription (77%) (United States Census Bureau, 2017). There is limited data available on the use of mobile or landline telephones amongst older adults, but by mid-2017 in Australia there were approximately 26.3 million mobile handset subscribers for a population of approximately 24 million (Australian Bureau of Statistics, 2017), suggesting that most of the population had access to a mobile telephone, and it is likely that many also have access to a landline telephone.

2.4.1 *Telerehabilitation for people with osteoarthritis*

Although there is substantial evidence to support the effectiveness of telehealth within medicine or psychology, there is more limited research regarding its effectiveness for people with musculoskeletal conditions. Telerehabilitation, which lies under the umbrella of telehealth, is the remote provision of rehabilitation services via telecommunication.
technology (Australian Physiotherapy Association, 2009b). A recent systematic review and meta-analysis of 13 studies found that telerehabilitation delivered by physiotherapists, surgeons, or nurses for management of musculoskeletal conditions (e.g. OA, low back pain, neck pain, joint-replacement) was effective in improving pain and physical function (Cottrell et al., 2016). In addition, sub-group analyses found that changes in physical function and disability following telerehabilitation were comparable to outcomes following traditional in-person consultations. However, in that review, there was heterogeneity in intervention design (i.e. mode of telerehabilitation, duration and frequency of consultations, and duration of intervention) and outcome measures used. Many studies also had small sample sizes and short intervention periods without long-term follow-ups, which reduces the generalisability of findings. Cost analyses suggest that telerehabilitation for musculoskeletal disorders can cost about the same or less than that home-visits, depending on the distances between patient homes and the health centre (Moffet et al., 2015; Tousignant et al., 2015).

Telerehabilitation is advocated by the Australian Physiotherapy Association and American Physical Therapy Association as an alternative model of physiotherapy service delivery (American Physical Therapy Association, 2017; Australian Physiotherapy Association, 2009a, 2009b). There is evidence from a systematic review that telerehabilitation delivered by physiotherapists for patients with physical disabilities (including neurological conditions, cardiac rehabilitation, spinal-cord injuries, and speech-language impairments) significantly improved clinical outcomes, which were similar to or better than the comparison intervention of in-person physiotherapy (Kairy et al., 2009). That systematic review also found that compliance to management programs was high in the telerehabilitation groups, but that consultation times tended to be longer.
Satisfaction with telerehabilitation was also reportedly high amongst patients but was lower in the physiotherapists who delivered the service.

Telerehabilitation is a particularly attractive model of service delivery for people with OA, where education and provision of a structured exercise program is the core recommended treatment, and ‘hands-on’ passive therapies are less effective and have little role in managing the condition. There is some preliminary evidence that exercise therapy delivered by physiotherapists via telerehabilitation is effective for people with OA. One study investigated the effect of a 6-week telephone-delivered exercise intervention by physiotherapists on quality of life (Odole & Ojo, 2014). The 50 people with knee OA who participated were randomised to either the telephone-delivered physiotherapy intervention or an in-person physiotherapy intervention. Significant improvements in quality of life following the telephone intervention were observed, with no significant differences between groups. However, the study had a small sample size, its only outcome measure was quality of life, and it did not include long-term follow-up.

There is more recent evidence that exercise management by a physiotherapist during internet-mediated video consultations, and combined with an online pain coping skills training program, is effective for people with knee OA (Bennell et al., 2017). The intervention involved online educational materials, seven video consultation sessions with a physiotherapist to receive an exercise program, and access to an online pain coping skills training program, with the control group receiving online educational material only. The authors found participants in the intervention group experienced significantly greater improvements in pain and function in both the short (three months) and long (nine months) term, compared to participants in the control group.
Most existing studies investigating telerehabilitation for people with musculoskeletal disorders have utilised various types of internet-mediated videoconferencing software to deliver care (Bennell et al., 2017; Moffet et al., 2015; Piquerás et al., 2013; Russell et al., 2011; Tousignant et al., 2011b). Although videoconferencing technologies allow patients to visually interact with the therapist, such modes of delivery may be challenging for some patients, particularly those with limited internet experience. Videoconferencing requires a reliable internet connection and a videoconferencing device with a microphone and camera, as well as videoconferencing software. Older adults are not necessarily familiar with, or comfortable using, such technology, and there are some areas of Australia that do not have broadband networks reliable enough for videoconferencing. In fact, in Australia, only 51% of people over the age of 65 used the internet (Australian Bureau of Statistics, 2015a), and, in the US, only 65% of households headed by a person aged 65 or over owned or used a computer, and only 62% had internet subscription (United States Census Bureau, 2017). As such, telephone services may be a more user-friendly and accessible mode of service delivery for many older adults. Only one previous study has investigated telephone-delivered exercise by a physiotherapist for people with OA (Odole & Ojo, 2014), however the intervention was not delivered exclusively over the telephone: patients in the telerehabilitation group reported to clinics in-person at three time-points during the intervention and were taught their exercises face-to-face in the clinic at the start of the study. As such, use of the telephone to provide exercise therapy to people with knee OA is an area with untapped potential that has received little research to date.

Despite the promising evidence supporting the effectiveness of telerehabilitation, implementation of telerehabilitation physiotherapy service models is slow, and almost
non-existent in Australia. In the UK, the National Health Service offers a musculoskeletal telephone service, ‘PhysioDirect’, which provides initial physiotherapist assessment and advice for acute and chronic musculoskeletal conditions. PhysioDirect has been shown to be equally clinically effective as waiting list-based care, and also provides faster access to physiotherapy (Salisbury et al., 2013b). With careful management of staff time, PhysioDirect also appears to be a cost-effective alternative to usual care (Salisbury et al., 2013a). Although there are currently no Australian telephone-based physiotherapy service models, telephone help lines do currently exist for people with musculoskeletal disorders. For example, MOVE-muscle, bone and joint health run a nurse-led musculoskeletal help line (https://www.move.org.au/page/helpline) which provides advice and support to people with musculoskeletal conditions, including treatment advice and linkages to community resources. The help line is freely available across Australia. Studies within thesis will explore the implementation of physiotherapist-delivered exercise therapy into this existing nurse-led musculoskeletal help line.

### 2.4.2 Acceptability of telerehabilitation

When considering new models of service delivery, such as telerehabilitation, translation from the research setting to the real world needs to be considered. Implementation of telehealth programs (e.g. within speech-language pathology, occupational therapy, neuropsychology, assistive technology, and cardiac and vocational rehabilitation) is reported to be difficult, with many programs failing to extend into clinical practice beyond the research or pilot phase (Broens et al., 2007). A review of telehealth studies revealed that a number of factors play a part in the success of implementation, including acceptance (i.e. user attitudes towards the service), technology used, service organisation, and policy and legislation (Brennan & Barker, 2008; Broens et al., 2007). According to
the Technology Acceptance Model, perceived usefulness and ease of use are the main determinants of intention to use new technology or technology-based services (Davis, 1989). In addition, user perceptions about telehealth, such as whether it is believed to be relevant, meaningful, and likely to be successful, are linked to user compliance and behavioural intention (Chau & Hu, 2002; Hu et al., 1999).

Previous research regarding willingness to use telehealth in chronic health conditions is promising. For example, patients with congestive heart failure and chronic obstructive pulmonary disease who have no prior experience with telehealth have expressed interest in using such services, viewing them as a useful and convenient mode of healthcare delivery, and valuing the potential benefits such as reduced transportation costs and flexibility (Cranen et al., 2012; Rahimpour et al., 2008). However, consumers have also expressed fears about loss of treatment motivation, reduced fellow sufferer contact, concerns about ease of use, lack of clinical support, feelings of low self-efficacy, issues of cost, anxiety, and reduced face-to-face therapist contact (Cranen et al., 2012; Rahimpour et al., 2008). There is also some evidence that perceptions about telehealth for chronic pain become more positive following experience using such a service. One study found that after people with chronic pain were given a 15-minute opportunity to use a web-based telemedicine service, their attitudes towards the perceived usefulness and ease of use of the service improved significantly (Cranen et al., 2011). Another study found that the perceptions of people with neck and shoulder pain who used a myofeedback teletreatment system changed significantly after experience, particularly regarding its ease of use (Huis in ’t Veld et al., 2010).
Presently, it is not clear whether people with OA and physiotherapists would be interested in using and delivering telerehabilitation service models, or whether they believe they would be effective or useful. Given that physiotherapy is traditionally viewed as a face-to-face encounter that is ‘hands-on’, characterised by direct observation and bodily contact (Bjorbaekmo & Mengshoel, 2016; Thornquist, 2006), physiotherapy-based telerehabilitation services may not be perceived as acceptable models of service delivery to people with OA, and possibly to the physiotherapists themselves. If people with OA or physiotherapists do not perceive telerehabilitation to be effective or acceptable, user uptake will be poor and, consequently, such services may be difficult to establish within the community. However, no previous studies have investigated the perceptions and attitudes people with OA or physiotherapists have towards telerehabilitation, and whether they would be willing to use or deliver such a service.

Experiences using telerehabilitation are also important to aid future design and implementation of these services. Three previous studies have found evidence that patients who have undergone total knee replacement surgery hold positive views about their experiences receiving care from a physiotherapist via videoconferencing software as part of a clinical trial (Kairy et al., 2013; Russell et al., 2011; Tousignant et al., 2011a). Two of those studies administered satisfaction questionnaires following the intervention, finding that most patients were highly satisfied with their experiences (Russell et al., 2011; Tousignant et al., 2011a), and that the physiotherapists involved in the trial also reported a high level of satisfaction (Tousignant et al., 2011a). The third study was qualitative and found that patients (n=5) valued the advantages of telerehabilitation, such as improved access, ease-of-use, and feeling of support, and all agreed that telerehabilitation was a good alternative to in-person physiotherapy sessions (Kairy et al.,
2013). People with various musculoskeletal conditions (n=57) who received advice from physiotherapists via the UK telephone service ‘PhysioDirect’ believed the service was accessible, convenient, and efficient (Pearson et al., 2016). However, they also believed the service was impersonal, that it was difficult to describe their symptoms via telephone, and, as such, believed that face-to-face care was more valuable. In addition, physiotherapists providing PhysioDirect (n=16) expressed concern at misdiagnosing the patient’s problem over the telephone, but felt more confident about diagnosis after experience delivering the service (Pearson et al., 2016; Salisbury et al., 2013a). Those physiotherapists also believed that they were only able to provide more generalised treatment via telephone and that it inhibited their therapeutic relationship with patients. However, physiotherapists did believe that a telephone service was an effective method of providing advice about self-management to patients with a chronic condition.

Within OA populations, there has only been one previous study examining perceptions and experiences receiving physiotherapy via telerehabilitation. A recent qualitative study explored the experiences of people with OA (n=12) and physiotherapists (n=8) who participated in a trial involving the delivery of exercise therapy via internet-mediated video-conferencing (Hinman et al., 2017a). Both people with OA who received care, and the physiotherapists involved in delivering care, described positive experiences, believing that it was convenient, empowered self-management, and had facilitated a positive therapeutic relationship. Participants also described a number of benefits, including reduced pain, improved function, and improved confidence and self-efficacy. However, physiotherapists believed that they had to adjust their routine treatment and modify their existing habits, and that they experienced some discomfort with the lack of ‘hands-on’ contact with the participant. As such, they felt video-conferencing was more useful as an
adjunct to usual in-person practice. No previous studies have explored the perceptions or experiences of people with OA or physiotherapists who have received or delivered exercise therapy via telephone. Given that telephone-delivered services do not allow physical or visual contact between clinicians and patients, it is possible that perceptions may differ from those who received or delivered care via internet-mediated video-conferencing.

In summary, telerehabilitation has the potential to increase the accessibility of physiotherapy services for people with OA. This, in turn, may improve exercise uptake and support long-term adherence, reducing the burden of the condition on both the individual sufferer and society. However, there are few telerehabilitation services for people with OA currently available in Australia. Examining the acceptability of these services amongst both people with OA and physiotherapists will help inform future implementation of such services. Currently, very little is known about the attitudes people within the community, who are likely naïve to telerehabilitation, have towards such models of service delivery. In addition, no previous research has investigated the experiences of people who have been involved in receiving or delivering exercise via telephone.

### 2.5 Supporting exercise adherence and behaviour change

When consulting via telerehabilitation, particularly when using the telephone, clinicians are unable to interact with their patients physically or visually. As such, they must be able to communicate effectively in a way that encourages self-management and adherence to prescribed exercise. Given that common barriers to exercise participation amongst people with OA include lack of motivation, conflict with routines, lack of goal setting, and lack
of participant input into the exercise program (Dobson et al., 2016), it is thus important that clinicians are able to provide personalised care via telerehabilitation that supports behaviour change. This section outlines the ways in which clinicians can support behaviour change and provide personalised care via telerehabilitation, and the importance of training physiotherapists to use such methods.

2.5.1 Behaviour change support

Participating in prescribed exercise programs and increasing physical activity often requires considerable behaviour change. The two fundamental cognitive drivers of behavioural intention are said to be motivation and self-efficacy (Bandura, 2001; Fishbein et al., 2001; Mason & Butler, 2010; Rollnick et al., 1999), both of which relate to the concept of ‘readiness to change’, which is the process of moving towards and initiating behaviour change (Prochaska & DiClemente, 1984; Prochaska et al., 2008). There are a large number of existing theories relating to health behaviour change (Armitage, 2005; Bandura, 1989; Davis et al., 2014; DiClemente et al., 1991; Fisher et al., 2006; Plotnikoff et al., 2008; Prochaska & Velicer, 1997; Rosenstock et al., 1988; Ryan & Deci, 2000), most of which are beyond the scope of this thesis. Commonly used theories of health behaviour change include the Theory of Planned Behaviour (Fishbein & Ajzen, 1977), Self-Determination Theory (Ryan & Deci, 2000), and Social Cognitive Theory (Bandura, 1989). The Theory of Planned Behaviour states that behavioural intention is influenced by attitudes towards the behaviour, subjective norms (i.e. perceived social pressure), and perceived behavioural control (Fishbein & Ajzen, 1977). Self-Determination Theory focuses on three innate needs that allow optimal motivation and engagement: i) competence (seeking to control outcomes and experience mastery); ii) relatedness (interacting and being connected to others), and; iii) autonomy (being a causal agent of
one’s own life) (Ryan & Deci, 2000). Finally, Social Cognitive Theory states that one’s behaviour is influenced by their environment (e.g. social norms, reinforcement), cognitive factors (e.g. knowledge, expectations, attitudes), and behavioural factors (e.g. skills, practice, self-efficacy) (Bandura, 1989).

Drawing from these existing theories of behaviour change, there are numerous strategies that clinicians can use to assist their patients to adhere to exercise and make positive behaviour changes (Bennell et al., 2014). These strategies commonly include education, goal setting, supervision of exercises, providing feedback, and self-monitoring techniques (e.g. exercise diary, pedometer) (Michie et al., 2011; Michie et al., 2013). A Cochrane review found that provision of supervised or individualised exercise programs and self-management techniques (e.g. education about pathology, how to manage symptoms, nutrition, weight management, increasing physical activity, and accessing community resources) enhance adherence to exercise in people with chronic musculoskeletal pain (Jordan et al., 2010). However, amongst the 42 trials included in the review, there was significant heterogeneity in methods used for improving and measuring adherence. Another more recent systematic review and meta-analysis found that booster sessions (follow-up consultations after discharge) with a physiotherapist assisted people with knee and/or hip OA to adhere to an exercise program (Nicolson et al., 2017a). It also identified evidence to support the use of motivational strategies (e.g. positive feedback and reinforcement, advice about posting self-reminders to exercise, use of an exercise diary, and use of a ‘treatment contract’). Survey data from 230 people with OA and 143 physiotherapists in Australia and New Zealand revealed that goal setting was perceived to be one of the most effective techniques to improve exercise adherence (Nicolson et al., 2017b).
Many of these strategies can be easily incorporated into telerehabilitation service models. For example, many motivational strategies (e.g. positive feedback, goal setting etc.) can be delivered remotely, and do not require face-to-face or in-person contact. In addition, given telerehabilitation may allow clinicians to more easily contact their patients, and vice versa, it could facilitate greater monitoring of patient progress and more regular review of exercise programs and/or goals. Regular monitoring and feedback has been linked to improved exercise beliefs and self-efficacy amongst people with OA (Hurley et al., 2010). Regular contact may also improve patient motivation to continue exercise participation, helping to promote adherence in the long-term.

\[2.5.2\] **Person-centred care**

Given that barriers and facilitators to exercise vary from person to person, it is vital that a personalised approach to care is adopted. In healthcare, interest has been growing in the provision of ‘person-centred’, or ‘patient-centred’, care. Although there is no globally accepted definition of person-centred care (Kitson et al., 2013) (International Alliance of Patient's Organisations, 2007), it can be broadly defined as “care that is respectful of and responsive to individual patient preferences, needs and values” and ensures “that patient values guide all clinical decisions” (pg.3) (National Research Council, 2001). Widely accepted dimensions of person-centred care include: i) fast access to reliable healthcare advice; ii) involvement of, and support for, family and carers; iii) emotional support, empathy, and respect; iv) effective treatment delivered by trusted professionals; v) clear, comprehensible information and support for self-care; vi) attention to physical and environmental needs; vii) continuity of care and smooth transitions, and; viii) involvement in decisions and respect for patient’s preferences (Gerteis et al., 1993; NRC
Picker, 2008) (Figure 2.12). Other commonly accepted elements of person-centred care include taking into account the patient’s situation, the patient’s own understanding and experience of their situation, and their participation in decision-making (Ekman et al., 2011; Leplege et al., 2007).

![Diagram of Picker's eight dimensions of person-centred care](image)

**Figure 2.12. Picker’s eight dimensions of person-centred care. Adapted from NRC Picker (2008).**

In Australia, practical policy and service-level recommendations support the use of person-centred care (Australian Commission on Safety and Quality in Healthcare, 2010). The Australian Commission on Safety and Quality in Health Care released a National Safety and Quality Framework (Australian Commission on Safety and Quality in Healthcare, 2009) that identified ‘patient-focused care’ as one of three dimensions required for a safe and high-quality healthcare system. Around the world, governments (National Health Service, 2005), international organisations (World Health Organisation,
2000), health policy organisations (Kings Fund, 2012; NRC Picker, 2008; Picker Institute, 2017; The Health Foundation, 2014), and lobby groups (International Alliance of Patient's Organisations, 2007) have all called for care that is more centred on the needs of the individual patient.

Person-centred care aids self-management of chronic diseases that involve the adoption of new behaviours (e.g. an exercise program) or changes in existing behaviour (e.g. smoking cessation) by taking into account individual patient wants, needs, and preferences (Mead & Bower, 2000). Person-centred communication has been shown to have beneficial effects on outcomes in a variety of patient populations, being positively associated with patient satisfaction, adherence, and better health outcomes (Ekman et al., 2012; Olsson et al., 2013; Rees & Williams, 2009; Stewart, 1995). A systematic review of 40 studies across a range of different populations found mixed evidence regarding the relationship between person-centred care and outcomes, but stronger evidence to support the positive effect of person-centred care on satisfaction and self-management (Rathert et al., 2012). Amongst people with chronic conditions (e.g. cancer, chronic pain, diabetes), another systematic review concluded that person-centred approaches to care were associated with high satisfaction and greater perceived quality of care (McMillan et al., 2013).

In physiotherapy, person-centred care is said to encompass the provision of individualised treatment, continuous communication, education, and goal setting to support and empower the patient (Cooper et al., 2008; Wijma et al., 2016). There is some evidence that the provision of person-centred care in physiotherapy is associated with better outcomes. For example, a recent systematic review aimed to identify factors that
influence patient-physiotherapist interactions, which is linked to favourable treatment outcomes (O’Keeffe et al., 2015). They found that physiotherapists’ interpersonal and communication skills (e.g. listening, being empathetic and friendly) and the provision of individualised person-centred care (e.g. taking the patient’s opinions into account and individualising their treatment) were perceived by patients and physiotherapists to be amongst the most important factors influencing the patient-therapist interaction. Another study that sought to identify “expert” physiotherapists (based on their patients’ outcomes) found that those who used a person-centred approach to care (i.e. using a collaborative approach and promotion of patient empowerment) were the ones classified as “experts” (Resnik & Jensen, 2003).

Patients themselves have also called for care that is person-centred. A recent systematic review of patients’ perceived health service needs for OA care found that receiving individualised care was perceived to be important for a positive patient-physician relationship (Papandony et al., 2017). In addition, patients in that study identified poor practitioner communication skills to be a source of dissatisfaction, and expressed a desire to receive empathy, reassurance, and education in a personalised way. Another study found that musculoskeletal patients believed that person-centredness (involving effective communication, knowledge and professionalism, an understanding of people, and transparency of progress and outcomes) was important in musculoskeletal physiotherapy interactions (Kidd et al., 2011).

2.5.3 Training clinicians in behaviour change support and person-centred care

Given that the focus of telerehabilitation is on effective communication between clinicians and patients, it is vital that physiotherapists delivering these services are skilled
in the provision of care that includes person-centred practices and behaviour change techniques. However, as discussed in Section 2.3.2, many are not practicing in ways that support behaviour change or reflect person-centred practices.

Many physiotherapists may lack the understanding and confidence to use person-centred practices or behaviour change techniques in their usual practice (Alexanders et al., 2015), which may be because traditional training of physiotherapists does not typically focus on teaching skills to support behaviour change, nor is theory of behaviour change a major component of the physiotherapy curriculum. Many physiotherapists may also be reluctant or unwilling to change their normal therapeutic behaviour (Stevenson et al., 2004). Given that it is ineffective to simply advise clinicians to change their clinical practice (Alexanders et al., 2015; Butler et al., 1998; Grimshaw & Russell, 1993), physiotherapists involved in telerehabilitation service models may require additional training in person-centred care and principles of behaviour change support in order to maximise clinical effectiveness and optimise patient outcomes. The European League Against Rheumatism has also highlighted the need for training to teach healthcare providers the skills needed to initiate and establish lifestyle changes in people with OA (Fernandes et al., 2013).

There is evidence that professional training and education can facilitate the adoption of person-centred practices (Moore et al., 2016). A Cochrane review aimed to assess the effectiveness of interventions for healthcare providers that aim to promote person-centred care approaches in clinical consultations (Dwamena et al., 2012). Their review included 43 randomised controlled trials, most of which involved primary care physicians and nurses, which showed generally positive effects on consultation processes (i.e. clarifying patient’s concerns or beliefs, communicating about treatment options, levels of empathy,
and patient’s perceptions of provider’s attentiveness to them and their concerns). There were mixed results regarding effects on patient satisfaction with care and health status. They concluded that interventions to promote person-centred care within clinical consultations were effective, however there was heterogeneity in outcomes measured, as well as health behaviour measures. In addition, none of the included studies involved physiotherapists. Another Cochrane review of interventions for improving healthcare professional’s adoption of shared-decision making was not able to draw firm conclusions given the paucity of evidence available (Légaré et al., 2010). They did find some evidence that professional training may be important (e.g. educational meetings, provision of feedback and educational materials, and using patient decision aids). Again, however, none of the included studies involved physiotherapists.

A small number of studies have reported on successfully training physiotherapists to use other biopsychosocial methodologies for people with chronic musculoskeletal conditions. One study evaluated the effectiveness of a pain coping skills training program for 11 physiotherapists in preparation for a clinical trial involving people with knee OA (Bryant et al., 2014). Their training program involved an initial four-day workshop, followed by a period of practice with pilot participants, and weekly tutorials. Skills were rated using an auditing tool and audio recording of consultations, and authors reported very high adherence to the program and satisfactory ratings of performance. A qualitative study with the same 11 physiotherapists found that they believed the training had enhanced their clinical practice and they felt confident delivering the pain coping skills program (Nielsen et al., 2014). Another study examined the effects of an 8-day university course that aimed to shift physiotherapists towards a more biopsychosocial treatment orientation (Overmeer et al., 2009). Changes in attitudes and beliefs were measured using a survey questionnaire.
administered before and after the training course, and the authors reported that attitudes became more biospsychosocially oriented following training. However, there was no change in the way patients perceived the physiotherapist’s practice behaviour or patient satisfaction. Another more recent study investigated the training of 13 physiotherapists to deliver a self-management intervention for people with OA and low back pain, involving a communication style that was underpinned by self-determination theory (Keogh et al., 2017). They assessed physiotherapist’s skills by measuring satisfaction with training, confidence in, and knowledge of, the communication strategies and intervention content, as well as their behaviour delivering the intervention (assessed via audit of audio-recorded consultations). After training, physiotherapists in that study had increased confidence and knowledge and delivered the intervention in a needs-supportive manner, however were not satisfactorily using goal setting techniques.

Currently, there is no evidence available to inform the training of clinicians in telephone communication skills (Vaona et al., 2017). All physiotherapists who deliver the telephone service “PhysioDirect” in the UK are required complete a specific training program and period of skills consolidation to enhance their listening and interviewing skills and become proficient and confident in assessing patients and delivering care remotely (Bishop et al., 2013). However, no previous studies have investigated the training of physiotherapists in person-centred practices and behaviour change support for telerehabilitation service models. More specifically, no previous studies have explored physiotherapist’s experiences participating in such a training program, or whether their beliefs about their role managing patients with OA changes after training. In addition, no previous studies have assessed physiotherapist’s skills using these person-centred
principles or behaviour change techniques during consultations, and whether they are able to implement these practices appropriately with people with OA.

2.6 Summary and aims of the thesis

In summary, knee and hip OA is highly prevalent and imposes a substantial impact on both the individual sufferer and society, creating a significant burden on healthcare systems across the world. Education and exercise are recommended as first-call management methods for all people with knee and hip OA. However, uptake of exercise amongst people with OA is poor, often because people have difficulties accessing services like physiotherapy for exercise management. Telerehabilitation service models may improve the accessibility of physiotherapy, yet little is known about the acceptability of these services amongst people with OA or physiotherapists. In addition, a vital component of telerehabilitation is the use of person-centred communication practices and behaviour change techniques to support exercise adherence and self-management. However, no previous studies have explored the training of physiotherapists in person-centred practices or behaviour change support for telephone-delivery.

Therefore, the aims of this thesis were to:

1) Investigate the perceptions people with hip and/or knee OA have about receiving exercise therapy from a physiotherapist via telephone and internet-mediated video, and whether they would be willing to use these services;

2) Investigate physiotherapists’ perceptions of, and willingness to deliver, telephone- and internet-mediated exercise therapy for people with knee and/or hip OA;
3) Explore physiotherapists’ experiences with, and the impacts of, a training program in person-centred practice and behaviour change support to assist them to effectively deliver exercise management via the telephone for people with knee OA;

4) Evaluate the fidelity of physiotherapists to telephone-delivered person-centred practice and behaviour change support immediately following training;

5) Explore the perceptions and experiences of people with knee OA who underwent exercise management delivered by physiotherapists via telephone;

6) Explore the perceptions and experiences of physiotherapists before and after providing exercise therapy to people with knee OA via telephone.

The specific aims of each individual study within this thesis will be described in the relevant chapter.
Chapter 3 Consumer perceptions of, and willingness to use, remotely-delivered service models for exercise management of knee and hip osteoarthritis: a cross-sectional survey

Reprinted from Arthritis Care and Research, Lawford BJ, Bennell KL, Hinman RS, Consumer perceptions of, and willingness to use, remotely-delivered service models for exercise management of knee and hip osteoarthritis: A cross-sectional survey. Arthritis Care and Research. 2017; 69 (5): 667-676. Copyright, with permission from Arthritis Care and Research (Appendix A); supplementary material (Appendix B).

Author contribution for this chapter are the following: study conception and design (RSH, BJL, KLB); data collection (BJL); data analysis (BJL) and interpretation of data (all authors); drafting of the manuscript (BJL); critical revision of the manuscript (all authors). All authors approved the final version of the manuscript.

This study was supported by funding from the National Health & Medical Research Council (Program Grant #631717 and Centre of Research Excellence #1079078). BJL is supported by a PhD stipend from the National Health & Medical Research Council Centre of Research Excellence (#1079078). KLB is supported by a National Health & Medical Research Council Fellowship (#1058440). RSH is supported by Australian Research Council Future Fellowship (FT130100175).
Chapter 3. Perceptions of people with OA towards telerehabilitation


BELINDA J. LAWFORD, KIM L. BENNELL, AND RANA S. HINMAN

Objective. To investigate the perceptions of people with hip and/or knee osteoarthritis (OA) about the remote delivery of exercise therapy by a physical therapist.

Methods. A survey of people age ≥45 years with a clinical diagnosis of hip and/or knee OA was conducted. The survey comprised 3 sections, including 1) demographic information, 2) statements about receiving exercise via the telephone, and 3) statements about receiving exercise via video over the internet. Data were analyzed by calculating response proportions and evaluating levels of agreement with each statement. Exploratory binomial regression analyses were performed to determine whether participant characteristics influenced perceptions of tele-rehabilitation.

Results. A total of 330 people spanning metropolitan, regional, and rural Australia completed the survey. Respondents were in majority (≥50%) agreement with 13 of 17 statements, with most agreement about tele-rehabilitation saving time (telephone versus video: 78% versus 81%), being easy to use (79% versus 78%), and maintaining privacy (86% versus 82%). There was no consensus agreement with liking the lack of physical contact (telephone versus video: 26% agreement versus 22%), willingness to pay (32% versus 46%), belief that telephone-delivered exercise would be effective (45%), and belief that a physical therapist could adequately monitor OA over the telephone (42%).

Conclusion. People with knee and/or hip OA hold mostly positive perceptions about tele-rehabilitation, delivered via the telephone or by video over the internet, for provision of physical therapist-prescribed exercise services. There was concern about the lack of physical contact with the therapist when using tele-rehabilitation.

INTRODUCTION

Osteoarthritis (OA) is a common health problem that causes pain, disability, and impaired quality of life. Both knee and hip OA have a high prevalence, affecting approximately 24% and 11% of the population, respectively (1), and are both ranked as the 11th highest contributor to global disability (2). As the population ages and rates of obesity increase, the prevalence of OA is projected to reach 30% in 2032 (2,3). This will lead to a large increase in demand for health services for OA in the future. As there is no cure for OA, accessible and effective models of health service delivery that can be provided on a population level are urgently needed to meet the rising burden of the condition.

All current clinical guidelines advocate exercise as a fundamental and core component of nonsurgical OA management (4). Muscle strengthening and aerobic exercise have been shown to improve pain and function by increasing muscle strength and physical fitness, and decreasing the burden of OA-associated comorbidities (5). The benefits of exercise on pain and physical function are similar to those of analgesics and nonsteroidal antiinflammatory drugs, but with fewer contraindications and side effects (5,6). Unfortunately, uptake of exercise among people with

Supported by funding from the National Health and Medical Research Council (program grant 631717 and Centre of Research Excellence 1079078), Ms Lawford’s work is supported by a PhD stipend from the National Health & Medical Research Council Centre of Research Excellence (grant 1079078). Dr Bennell’s work is supported by a National Health & Medical Research Council Fellowship (grant 1034440). Dr Hinman’s work is supported by an Australian Research Council Future Fellowship (FT130100175).

Belinda J. Lawford, BMedSci, BHealthSci(Hons), Kim L. Bennell, BAppSc(Physio), PhD, Rana S. Hinman, BPhysio(Hons), PhD: Centre for Health, Exercise and Sports Medicine, School of Health Sciences, The University of Melbourne, Melbourne, Victoria, Australia.

Address correspondence to Rana S. Hinman, BPhysio(Hons), PhD, Centre for Health Exercise and Sports Medicine, School of Health Sciences, University of Melbourne, Parkville, Victoria, Australia 3010. E-mail: ranash@unimelb.edu.au.

Submitted for publication April 26, 2016, accepted in revised form October 4, 2016.
Significance & Innovations

- Remote models of service delivery can increase the accessibility of physical therapy services for people with hip and/or knee osteoarthritis (OA), which may improve exercise uptake and clinical outcomes in this population, reducing the burden of OA on society.
- This is the first study to investigate the perceptions people with knee and/or hip OA have about tele-rehabilitation (remote) models of service delivery for physical therapist–prescribed exercise.
- Most people with hip and/or knee OA have positive perceptions about care delivered over the telephone, or via video over the internet, acknowledging ease of use and time-saving advantages.
- However, there was uncertainty about receiving care that does not involve physical contact with the therapist, which may impact patient perceptions about the effectiveness of care received via tele-rehabilitation.

Chapter 3. Perceptions of people with OA towards telerehabilitation

hip and/or knee OA is low internationally (7–9). For people with OA, exercise advice is typically provided by physical therapists, but for many patients transport issues or geographic location may preclude visiting physical therapists, particularly in regional, rural, and remote areas where such services may be limited or nonexistent (10–12).

Tele-rehabilitation, defined as the remote provision of rehabilitation services using telecommunication technology (13), is a model of service delivery that may improve access to specialist advice for exercise management, allowing patients to consult with a therapist from their own home or workplace. Research in people who have undergone knee arthroplasty has found tele-rehabilitation outcomes to be comparable to conventional face-to-face care (14–16). The single small study investigating the role of tele-rehabilitation for exercise management of people with knee OA supports these findings (17).

Little is known about the perceptions people with OA have about remotely delivered models of exercise management. Successful implementation of tele-rehabilitation models of service delivery is dependent upon user acceptance and perceived usefulness of the service (18–20). Previous research has found that patients with chronic pain (21) or chronic diseases (e.g., congestive heart failure, chronic obstructive pulmonary disease) (22) with no prior tele-rehabilitation experience express intent to use such services, viewing them as a useful and convenient mode of health care delivery, and valuing the potential benefits such as reduced transportation costs and flexibility. However, consumers have also expressed fears about decreased contact with fellow patients and concerns about ease of use, issues of cost, and reduced face-to-face therapist contact (21,22). As physical therapy (PT) services are traditionally viewed as a face-to-face encounter that is hands-on (23), PT-based tele-rehabilitation services may be less acceptable to people with OA, but this has not yet been explored. The aim of this study was to investigate consumer perceptions about, and willingness to use, remotely delivered service models for physical therapist–prescribed exercise management of hip and/or knee OA.

MATERIALS AND METHODS

Study design and participants. A descriptive, cross-sectional national survey was undertaken. People with clinical hip and/or knee OA living in rural, regional, and metropolitan areas of Australia were recruited between August 2015 and February 2016. People were recruited by advertisements on the Centre for Health, Exercise & Sports Medicine web site, community newsletters, and using social media (Facebook). Additionally, people who had previously volunteered for research studies conducted by the researchers and who had consented to be contacted for future studies were sent an invitation to participate. To ensure a geographical spread of participants from locations across Australia, some Facebook advertisements were specifically targeted toward interstate, regional, and remote areas. We aimed for a minimum sample size of 300 to ensure reasonably accurate estimates of proportions agreeing with statements for the target population of hip and knee OA. Assuming 90% agreement with statements, a minimum sample of 300 people would ensure a maximum width of 11% in the 95% confidence intervals (95% CIs) around the proportions.

Inclusion criteria were 1) being age ≥45 years, 2) being able to read and understand English, and 3) having knee and/or hip OA. A clinical diagnosis of OA was confirmed at the start of the survey according to the National Institute for Health and Care Excellence criteria for clinical diagnosis of OA (24). Participants were required to respond positively to the following 3 questions: are you age ≥45 years? Do you experience activity-related hip and/or knee pain (such as pain in your hip/knee when you perform activities such as walking, getting up from a chair, dressing, or bending down)? Do you have morning stiffness in the knee and/or hip that lasts for ≥30 minutes?

Survey instrument. Participants completed a survey (either online via SurveyGizmo or on hardcopy returned via reply-paid post) regarding their perceptions about receiving a physical therapist–prescribed exercise program over the telephone and via video over the internet (e.g., Skype, FaceTime). The survey comprised 3 sections (see Supplementary Appendix A, available on the Arthritis Care & Research web site at http://onlinelibrary.wiley.com/doi/10.1002/acr.23122/abstract). Section A asked for basic demographic data (e.g., age, sex, level of education), information about the osteoarthritic joint(s), and use of and familiarity with technology. Sections B and C of the survey were adapted from some statements of the Telemedicine Perception Questionnaire (25) (items 1–10) and also included some custom-developed statements (items 11–17). Each of these sections thus included 17 statements about receiving an exercise program from a physical therapist over the telephone (section B) and via video over the
internet (section C). For consistency, all perception statements were framed positively (i.e., “I agree that...”). Respondents were asked to rate their agreement with each statement on a 5-point Likert scale ranging from “strongly agree” to “strongly disagree.”

**Data analysis.** All data were downloaded from SurveyGizmo and processed in Excel (Microsoft Corporation). Geographic residential locations of respondents were categorized by postal codes into major cities, inner regional areas, outer regional areas, remote areas, and very remote areas (http://www.health.gov.au/internet/otd/publishing.nsf/Content/locator).

Data analysis was carried out with the Statistical Package for the Social Sciences (SPSS; version 22, IBM). Descriptive statistics were calculated. Data pertaining to statements (sections B and C) were described as number (percentage), with 55% CI calculated around proportions. To assess levels of agreement among respondents within each statement, we evaluated the percentage of participants who marked strongly agree and agree for each statement. According to the methods of Holden et al (26), we defined 100% as unanimity, 75–90% as consensus, 51–74% as majority view, and 0–50% as no consensus. To compare perceptions of exercise delivered over the telephone and exercise delivered via video over the internet, CIs around response distributions for overall agreement and disagreement were compared. If CIs did not overlap, it was assumed that there was a significant difference in response distribution.

To explore whether participant characteristics influenced perceptions, we conducted binomial logistic regression analyses using responses to the statement, “If there was a service offering physical therapist–prescribed exercise over the telephone or internet for my OA, I would be interested in using it,” for each of the telephone and video services. For the dependent variables, participants were classified as being either in agreement (i.e., marked strongly agree or agree) or not in agreement (i.e., marked unsure, disagree, or strongly disagree). Independent variables included age, sex, level of education, financial situation, joint affected by OA, previous experience with PT interventions, and geographical remoteness classification. Some response categories for financial situation, level of education, and remoteness classification were grouped together to increase sample size. Analyses were performed using SPSS.

### RESULTS

**Characteristics of the participants.** A total of 330 people provided complete data sets. The characteristics of respondents are shown in Table 1. All but 1 participant completed the survey online. Most participants were women, and many had OA, although hip OA was also represented. Most participants resided in major cities, with approximately one-third from regional centers and a few from remote areas. Most respondents had seen a physical therapist before, either for their OA or another health condition. The majority had no previous experience with tele-rehabilitation, and for those that had, most had consulted with a health professional over the telephone rather than via video over the internet.

**Familiarity with technology.** Table 2 summarizes the levels of familiarity with technology reported by the cohort. Almost all participants owned a mobile telephone, and at least half owned either a tablet or computer as well. Only 1 respondent had no access to the internet on any device. Most participants were quite a bit or extremely confident using a mobile telephone (n = 250, 76%) or computer (n = 257, 79%) and most had been using the internet for more than 6 years.

**Perceptions about tele-rehabilitation.** Responses to statements for each of the telephone and video service delivery
Chapter 3. Perceptions of people with OA towards telerehabilitation

Table 2. Familiarity with technology across the cohort (n = 330)*

<table>
<thead>
<tr>
<th></th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Owned electronic devices</strong></td>
<td></td>
</tr>
<tr>
<td>Mobile phone</td>
<td>313 (95)</td>
</tr>
<tr>
<td>Hand-held tablet/iPad</td>
<td>205 (62)</td>
</tr>
<tr>
<td>Laptop/notebook computer</td>
<td>199 (60)</td>
</tr>
<tr>
<td>Desktop computer</td>
<td>172 (52)</td>
</tr>
<tr>
<td>None of the above</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Owned devices with internet access</strong></td>
<td></td>
</tr>
<tr>
<td>Mobile phone</td>
<td>243 (74)</td>
</tr>
<tr>
<td>Hand-held tablet/iPad</td>
<td>185 (59)</td>
</tr>
<tr>
<td>Laptop/notebook computer</td>
<td>199 (60)</td>
</tr>
<tr>
<td>Desktop computer</td>
<td>167 (51)</td>
</tr>
<tr>
<td>None of the above</td>
<td>1 (0)</td>
</tr>
<tr>
<td><strong>Mobile phone use</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Once every few months</td>
<td>6 (2)</td>
</tr>
<tr>
<td>Once a month</td>
<td>7 (2)</td>
</tr>
<tr>
<td>Once a week</td>
<td>13 (4)</td>
</tr>
<tr>
<td>Several times a week</td>
<td>49 (15)</td>
</tr>
<tr>
<td>Every day</td>
<td>230 (70)</td>
</tr>
<tr>
<td><strong>Confidence with a mobile phone</strong></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>0 (0)</td>
</tr>
<tr>
<td>A little</td>
<td>15 (4)</td>
</tr>
<tr>
<td>Moderately</td>
<td>58 (18)</td>
</tr>
<tr>
<td>Quite a bit</td>
<td>112 (35)</td>
</tr>
<tr>
<td>Extremely</td>
<td>138 (43)</td>
</tr>
<tr>
<td><strong>Computer use</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>7 (2)</td>
</tr>
<tr>
<td>Once every few months</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Once a month</td>
<td>6 (2)</td>
</tr>
<tr>
<td>Once a week</td>
<td>17 (5)</td>
</tr>
<tr>
<td>Several times a week</td>
<td>47 (15)</td>
</tr>
<tr>
<td>Every day</td>
<td>245 (75)</td>
</tr>
<tr>
<td><strong>Confidence with a computer</strong></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>2 (1)</td>
</tr>
<tr>
<td>A little</td>
<td>8 (3)</td>
</tr>
<tr>
<td>Moderately</td>
<td>57 (17)</td>
</tr>
<tr>
<td>Quite a bit</td>
<td>135 (35)</td>
</tr>
<tr>
<td>Extremely</td>
<td>142 (44)</td>
</tr>
<tr>
<td><strong>Internet use</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Once every few months</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Once a month</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Once a week</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Several times a week</td>
<td>31 (9)</td>
</tr>
<tr>
<td>Every day</td>
<td>263 (87)</td>
</tr>
<tr>
<td><strong>Years of using the internet</strong></td>
<td></td>
</tr>
<tr>
<td>Never used the internet</td>
<td>0 (0)</td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>0 (0)</td>
</tr>
<tr>
<td>1–2 years</td>
<td>8 (2)</td>
</tr>
<tr>
<td>3–4 years</td>
<td>22 (7)</td>
</tr>
<tr>
<td>5–6 years</td>
<td>20 (7)</td>
</tr>
<tr>
<td>&gt;6 years</td>
<td>276 (84)</td>
</tr>
<tr>
<td><strong>Ability to use the internet</strong></td>
<td></td>
</tr>
<tr>
<td>Never used the internet</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Poor</td>
<td>5 (2)</td>
</tr>
<tr>
<td>Fair</td>
<td>41 (12)</td>
</tr>
<tr>
<td>Good</td>
<td>153 (47)</td>
</tr>
<tr>
<td>Excellent</td>
<td>127 (39)</td>
</tr>
<tr>
<td><strong>Confidence using video chat services</strong></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>22 (7)</td>
</tr>
<tr>
<td>A little</td>
<td>30 (9)</td>
</tr>
<tr>
<td>Moderately</td>
<td>93 (28)</td>
</tr>
<tr>
<td>Quite a bit</td>
<td>97 (29)</td>
</tr>
<tr>
<td>Extremely</td>
<td>84 (26)</td>
</tr>
</tbody>
</table>

* Individual items may not add to totals due to missing data.

models are displayed in Table 3, with consensus agreement in Figure 1. There was at least majority agreement (≥50% of respondents agree or strongly agree) for most (13 of 17) statements; however, only 5 statements achieved consensus agreement (≥75% agree or strongly agree). These included 1) having a physical therapist prescribe exercise over the telephone, or by video over the internet, would save time (telephone versus video: 78% versus 81%), 2) having a physical therapist prescribe exercise via video over the internet would be convenient (78%), 3) using the telephone or video over the internet to consult a physical therapist for exercise would be easy (79% versus 78%), 4) using video over the internet would be a useful (practical) way to receive a physical therapist–prescribed exercise program for OA (76%), and 5) privacy would not be violated with an exercise program over the telephone or video over the internet (86% versus 62%).

There was no consensus agreement regarding the statements relating to 1) liking the lack of physical contact with the therapist prescribing exercise over the telephone or via video (20% versus 22% agreement), 2) being willing to pay for physical therapist–prescribed exercise over the telephone or via video (32% versus 46%), 3) effectiveness of telephone-delivered exercise by a physical therapist (45%), and 4) belief that a physical therapist would be able to adequately monitor OA over the telephone (42%).

For most statements (11 of 17), response distributions were similar for both modes of service delivery, indicating no clear preference for either telephone or video. However, video was preferred over the telephone for the remaining 6 statements. More respondents agreed that exercise delivered via video over the internet would be effective (telephone versus video: 45% [95% CI 40%–51%] versus 64% [95% CI 59%–68%]), useful (65% [95% CI 60%–70%] versus 76% [95% CI 71%–81%]), and acceptable (56% [95% CI 51%–62%] versus 72% [95% CI 66%–77%]) compared to the telephone. Similarly, more people agreed that using video would allow the therapist to get a good understanding of their OA (telephone versus video: 57% [95% CI 51%–61%] versus 71% [95% CI 66%–76%]) and to adequately monitor their OA (42% [95% CI 36%–48%] versus 57% [95% CI 51%–62%]) compared to the telephone. More respondents were willing to pay for a service via video over the internet compared to the telephone (telephone versus video: 32% [95% CI 27%–37%] versus 46% [95% CI 40%–52%]).

Influence of participant characteristics on interest in using tele-rehabilitation is displayed in Tables 4 and 5. None of the independent variables contributed significantly to the model for interest in using telephone-delivered services. For interest in using services delivered via video, people who had hip OA had 2.5 times the odds of not agreeing, compared to those with knee OA. Similarly for video services, the odds of not agreeing were reduced by approximately one-half in people who were able to manage financially, compared to those who were in financial strain or had to be careful with their money.
Chapter 3. Perceptions of people with OA towards telerehabilitation

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise is beneficial for OA.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>An exercise program prescribed by a PT would improve my OA.</td>
<td>138 (43; 37-49)</td>
<td>117 (36; 30-41)</td>
<td>63 (19; 16-24)</td>
<td>7 (2; 1-4)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>A PT would get a good understanding of my OA over the...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>36 (15; 8-15)</td>
<td>151 (46; 40-51)</td>
<td>121 (37; 32-43)</td>
<td>18 (5; 3-8)</td>
<td>4 (1; 0-2)</td>
</tr>
<tr>
<td>Internet video</td>
<td>48 (15; 11-19)</td>
<td>183 (56; 50-61)</td>
<td>84 (25; 22-30)</td>
<td>10 (3; 1-5)</td>
<td>2 (1; 0-2)</td>
</tr>
<tr>
<td>My privacy would not be violated if the PT prescribed me an exercise program over the...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>108 (33; 28-38)</td>
<td>174 (53; 48-58)</td>
<td>23 (7; 4-10)</td>
<td>16 (5; 2-7)</td>
<td>7 (2; 1-4)</td>
</tr>
<tr>
<td>Internet video</td>
<td>69 (21; 17-26)</td>
<td>196 (61; 54-66)</td>
<td>45 (14; 10-18)</td>
<td>11 (3; 2-5)</td>
<td>3 (1; 0-2)</td>
</tr>
<tr>
<td>Using the ___ to consult the PT for a prescribed exercise program would be easy for me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>74 (23; 18-27)</td>
<td>184 (56; 50-61)</td>
<td>51 (15; 12-20)</td>
<td>16 (5; 2-8)</td>
<td>4 (1; 0-3)</td>
</tr>
<tr>
<td>Internet video</td>
<td>55 (17; 13-21)</td>
<td>198 (61; 55-65)</td>
<td>54 (16; 13-21)</td>
<td>15 (5; 3-7)</td>
<td>4 (1; 0-2)</td>
</tr>
<tr>
<td>I would be as satisfied talking to the PT over the ___ as I would be talking to the PT in person in their consulting room.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>41 (12; 9-17)</td>
<td>163 (50; 45-55)</td>
<td>73 (22; 17-27)</td>
<td>45 (14; 10-17)</td>
<td>7 (2; 1-4)</td>
</tr>
<tr>
<td>Internet video</td>
<td>46 (14; 11-18)</td>
<td>176 (54; 49-59)</td>
<td>69 (21; 16-26)</td>
<td>30 (9; 6-13)</td>
<td>5 (2; 0-3)</td>
</tr>
<tr>
<td>An exercise program prescribed by a PT over the ___ would improve my OA.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>40 (12; 8-16)</td>
<td>130 (40; 35-46)</td>
<td>147 (45; 39-51)</td>
<td>9 (3; 1-5)</td>
<td>1 (0; 0-1)</td>
</tr>
<tr>
<td>Internet video</td>
<td>37 (12; 8-15)</td>
<td>147 (46; 40-51)</td>
<td>129 (40; 35-45)</td>
<td>8 (2; 1-4)</td>
<td>1 (0; 0-1)</td>
</tr>
<tr>
<td>An exercise program prescribed by a PT over the ___ would save me money.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>62 (19; 15-24)</td>
<td>102 (30; 45-56)</td>
<td>94 (29; 24-34)</td>
<td>5 (2; 0-3)</td>
<td>0 (0; 0-0)</td>
</tr>
<tr>
<td>Internet video</td>
<td>39 (12; 8-16)</td>
<td>155 (48; 42-53)</td>
<td>121 (37; 32-43)</td>
<td>10 (3; 1-5)</td>
<td>1 (0; 0-1)</td>
</tr>
<tr>
<td>The PT would be able to adequately monitor my OA over the...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>19 (6; 3-8)</td>
<td>119 (36; 31-42)</td>
<td>150 (49; 43-54)</td>
<td>26 (8; 5-11)</td>
<td>3 (1; 0-2)</td>
</tr>
<tr>
<td>Internet video</td>
<td>25 (8; 5-11)</td>
<td>159 (49; 43-54)</td>
<td>117 (36; 31-43)</td>
<td>19 (6; 4-6)</td>
<td>2 (1; 0-2)</td>
</tr>
<tr>
<td>I like that there would be no physical contact</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with the PT prescribing exercise over the ___</td>
<td>8 (2; 1-4)</td>
<td>57 (18; 14-22)</td>
<td>135 (41; 36-46)</td>
<td>107 (33; 28-38)</td>
<td>18 (6; 3-8)</td>
</tr>
<tr>
<td>Internet video</td>
<td>15 (5; 3-7)</td>
<td>56 (17; 13-22)</td>
<td>134 (41; 36-47)</td>
<td>105 (33; 27-38)</td>
<td>13 (4; 2-6)</td>
</tr>
<tr>
<td>Having a PT prescribe exercise over the ___ would be a convenient form of health care for me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>50 (15; 12-19)</td>
<td>191 (59; 53-64)</td>
<td>61 (19; 15-24)</td>
<td>18 (6; 3-8)</td>
<td>4 (1; 0-3)</td>
</tr>
<tr>
<td>Internet video</td>
<td>49 (15; 11-19)</td>
<td>208 (63; 59-69)</td>
<td>55 (17; 13-21)</td>
<td>13 (4; 2-6)</td>
<td>2 (1; 0-2)</td>
</tr>
<tr>
<td>Having a PT prescribe exercise over the ___ would save me time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>78 (24; 20-29)</td>
<td>178 (54; 49-60)</td>
<td>52 (16; 12-19)</td>
<td>16 (5; 3-7)</td>
<td>3 (1; 0-2)</td>
</tr>
<tr>
<td>Internet video</td>
<td>59 (18; 14-22)</td>
<td>203 (63; 57-68)</td>
<td>50 (15; 12-19)</td>
<td>12 (4; 2-6)</td>
<td>1 (0; 0-1)</td>
</tr>
<tr>
<td>If there was a service offering PT-prescribed exercise over the ___ for my OA, I would be interested in using it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>64 (20; 15-24)</td>
<td>174 (54; 49-60)</td>
<td>65 (20; 16-25)</td>
<td>17 (5; 3-6)</td>
<td>2 (1; 0-3)</td>
</tr>
<tr>
<td>Internet video</td>
<td>45 (14; 11-18)</td>
<td>187 (58; 52-64)</td>
<td>71 (22; 18-26)</td>
<td>16 (5; 3-7)</td>
<td>4 (1; 0-1)</td>
</tr>
<tr>
<td>If there was a service offering PT-prescribed exercise over the ___ for my OA, I would be willing to pay for it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>13 (4; 2-6)</td>
<td>135 (42; 37-48)</td>
<td>137 (43; 38-49)</td>
<td>31 (10; 7-13)</td>
<td>5 (1; 0-3)</td>
</tr>
<tr>
<td>Internet video</td>
<td>12 (4; 2-6)</td>
<td>135 (42; 37-48)</td>
<td>137 (43; 38-49)</td>
<td>31 (10; 7-13)</td>
<td>5 (1; 0-3)</td>
</tr>
<tr>
<td>Using the ___ would be an acceptable way to receive a PT-prescribed exercise program for my OA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>24 (7; 5-11)</td>
<td>157 (49; 44-54)</td>
<td>111 (34; 29-40)</td>
<td>26 (8; 5-11)</td>
<td>6 (2; 1-3)</td>
</tr>
<tr>
<td>Internet video</td>
<td>35 (11; 7-14)</td>
<td>198 (61; 56-66)</td>
<td>69 (21; 16-26)</td>
<td>19 (6; 3-6)</td>
<td>3 (1; 0-2)</td>
</tr>
</tbody>
</table>

[continued]
Table 3. (Cont’d)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the ___ would be a useful (practical) way to receive a PT-prescribed exercise program for my OA</td>
<td>26 (9; 6–12)</td>
<td>183 (56; 50–62)</td>
<td>84 (26; 21–31)</td>
<td>25 (8; 5–11)</td>
<td>5 (1; 0–3)</td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet video</td>
<td>41 (13; 9–1)</td>
<td>205 (63; 59–68)</td>
<td>59 (18; 14–23)</td>
<td>16 (5; 3–8)</td>
<td>3 (1; 0–2)</td>
</tr>
<tr>
<td>Using the ___ would be an effective way to receive a PT-prescribed exercise program for my OA</td>
<td>17 (5; 3–8)</td>
<td>131 (40; 36–46)</td>
<td>147 (46; 40–50)</td>
<td>25 (8; 5–11)</td>
<td>4 (1; 0–3)</td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet video</td>
<td>34 (11; 7–14)</td>
<td>172 (53; 48–59)</td>
<td>101 (31; 26–37)</td>
<td>14 (4; 2–7)</td>
<td>2 (1; 0–2)</td>
</tr>
<tr>
<td>Using the ___ would be an affordable way to receive a</td>
<td>17 (5; 3–8)</td>
<td>168 (51; 45–57)</td>
<td>132 (41; 35–46)</td>
<td>8 (2; 1–4)</td>
<td>2 (1; 0–2)</td>
</tr>
<tr>
<td>PT-prescribed exercise program for my OA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>25 (8; 5–11)</td>
<td>155 (48; 42–53)</td>
<td>130 (40; 36–56)</td>
<td>11 (3; 2–6)</td>
<td>3 (1; 0–2)</td>
</tr>
<tr>
<td>Internet video</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using the ___ would be a safe way to receive a</td>
<td>21 (6; 4–9)</td>
<td>152 (46; 40–53)</td>
<td>131 (41; 34–46)</td>
<td>14 (4; 3–7)</td>
<td>8 (3; 1–4)</td>
</tr>
<tr>
<td>PT-prescribed exercise program for my OA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>32 (10; 7–13)</td>
<td>176 (55; 49–60)</td>
<td>90 (30; 26–56)</td>
<td>13 (4; 2–6)</td>
<td>3 (1; 0–2)</td>
</tr>
<tr>
<td>Internet video</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Values are the number (% of respondents; 95% confidence interval). Individual items may not add to totals due to missing data. PT = physical therapist; OA = osteoarthritis.

DISCUSSION

Our study aimed to investigate the perceptions of people with hip and/or knee OA about the remote delivery of exercise by a physical therapist. In our sample, there was consensus agreement about the convenience, ease of use, and privacy of such a service delivered over the telephone as well as via video over the internet. Our findings also showed most people with knee and/or hip OA hold positive perceptions about factors relating to the acceptability of such models of service delivery, and most believed that they would be interested in using such services if they existed. However, there was no consensus agreement regarding willingness to pay for remotely delivered services and liking the lack of physical contact with the therapist when consulting remotely.

To our knowledge, ours is the first survey investigating the perceptions of people with OA about the use of tele-rehabilitation for physical therapist-prescribed exercise. Previously, small qualitative studies had explored expectations about prospective tele-rehabilitation programs in people with congestive heart failure and/or chronic obstructive pulmonary disease (22), chronic pain (21), and in older adults without any specific health condition (27). A small number of studies have also explored experiences after undergoing tele-rehabilitation following arthroplasty (16,28,29). Collectively, these studies found that participants believed tele-rehabilitation would be a useful and convenient mode of service delivery, but had concerns about using the technology, as well as reduced contact with fellow patients and the treating health professional. Our data from a sample of people with hip/knee OA are broadly consistent with these findings, with our survey respondents acknowledging the advantages of remote models of service delivery. However, in contrast, our sample did not express concern about using the technology, and in fact, agreement about ease of technology use was one of the few statements that reached consensus. This may be because previous studies utilized complex and sophisticated videoconferencing systems that incorporated an extensive suite of clinical measurement tools (e.g., a single lead electrocardiogram, pulse oximeter, etc.) (22) and feedback sensors about physical movements during exercise (21). In contrast, we explored the acceptability of simple and readily available technology that can be found in most homes and that many people already use on a regular basis for social purposes. Furthermore, we recruited 54% of our participants through social media, which may have biased our sample toward those who have greater confidence in using technology, and a large proportion of our cohort were highly educated (63% having university or higher university degrees), which is in contrast to previous studies where most participants had a low level of education (21).

Our findings indicate that people with OA most strongly value tele-rehabilitation’s potential to save time, offer convenience, be easy to use, and maintain their privacy. These values are consistent with findings of previous research exploring barriers to exercise participation in this patient group (12,30,31). Difficulties accessing therapists and/or exercise facilities due to lack of transport and/or car parking have been highlighted as a major barrier. Other barriers include lacking the time to attend appointments or participate in therapy, and/or believing that exercise would conflict with everyday routines. As tele-rehabilitation allows patients to consult with a therapist from their own home or workplace, this may enable patients to better incorporate exercise into their daily routines and overcome barriers associated with transport or parking difficulties.

Although survey participants were generally positive about tele-rehabilitation for receiving physical therapist—
prescribed exercise, there were some statements where no consensus agreement was reached. Less than 23% of people agreed that they would like the lack of physical contact with the therapist when consulting remotely. These findings are consistent with a qualitative study by Cranen et al (21) who found that chronic pain patients thought they would feel insecure and would perform exercises incorrectly in the absence of visual and face-to-face supervision from a therapist. Physical touch is known to play an important role in PT, particularly as a means to develop trust and connect with the patient (32–34). However, no previous studies have investigated whether exercise performance or outcomes are improved when a physical therapist is able to touch a patient when prescribing exercise, or whether verbal descriptions and recommendations for exercise are sufficient. Our findings suggest that service providers who are considering using tele-rehabilitation delivery models may wish to consider a blended model of both face-to-face care combined with remotely delivered consultations. In addition, tele-rehabilitation models of care for people with OA should incorporate education for patients about the benefits of exercise, and to reassure them that “hands-on” therapies are only recommended as adjunct treatments for OA (4), and that there is no evidence that class-based or supervised exercise programs are more effective than home-based programs (5). The importance of educating patients about OA management is further highlighted by our finding that almost one-third of respondents were unsure about whether exercise was beneficial for OA, despite the fact that exercise is 1 of 3 core management approaches and is advocated by all current clinical guidelines (4). Future studies should investigate the reasons why people with OA believe that physical contact is important when consulting a physical therapist, and whether this belief can be changed with education and/or experience using tele-rehabilitation.

Only 32–46% of the survey cohort agreed or strongly agreed that they would be willing to pay for a service that offered physical therapist–prescribed exercise via tele-rehabilitation. These findings reflect those reported elsewhere, where people with congestive heart failure and/or chronic obstructive pulmonary disease (22) and older adults (27) expressed concerns about the cost of tele-rehabilitation, recommending that the system be provided in a way that would be affordable to consumers. These findings suggest that future tele-rehabilitation services may be better suited to public health care sectors, where out-of-pocket costs to patients are reduced, rather than the private health care sector where patients incur out-of-pocket costs for services. However, it should also be noted that almost 50% of our cohort were unsure about their willingness to pay. This may be reflective of a limitation of our survey, as we did not provide any benchmark indicators about potential costs of such services for respondents to judge willingness to pay against. Future studies should investigate the reasons why people with OA may or may not be willing to pay for tele-rehabilitation services, and how such services can be made more appealing.

For some statements, respondents appeared to believe that exercise delivered over the telephone would be less...
acceptable, effective, and useful than delivery via video. This suggests that tele-rehabilitation services for people with OA should utilize video rather than telephone. However, videoconferencing requires access to an appropriate device (i.e., a computer/laptop/tablet with a microphone and camera) with videoconferencing software, a reliable internet connection, and the skills to confidently operate the technology. In this study, almost the entire cohort owned a mobile telephone, but only approximately 60% owned a desktop computer, laptop, or tablet device. Additionally, only 26% of survey respondents said they would be “extremely” confident using videoconferencing software. Therefore, health care providers considering tele-rehabilitation services for knee OA may wish to use hybrid models of service delivery that offer both telephone and video options to give patients the flexibility of choosing the mode of delivery most suitable for their individual circumstances.

Our findings showed few participant characteristics to be influential in determining interest in using either telephone or video PT tele-rehabilitation services, suggesting that such services are applicable to a wide range of people with OA. Although financial situation had no significant influence on interest in using telephone services, people who were able to manage without much difficulty were more likely to be interested in using video-delivered services than people who were financially strained. This may be because video services require an internet connection and more sophisticated equipment that come at a financial cost. Interestingly, people with hip OA were less interested in using video services than those with knee OA. It is not clear from this cross-sectional survey why this is the case, but these results must be interpreted cautiously given that only 13% of the entire cohort comprised people with hip OA only. We found that geographical remoteness had no significant influence on interest in using telephone or video services, which may be because our sample of people living in remote areas was too small to detect any significant differences. It is possible that, even though physical therapists in Australia are primarily metropolitan based (35), people with OA living in metropolitan cities may value services that allow them to consult remotely from their own home so they can avoid heavy traffic conditions or parking difficulties when traveling to and from clinics.

Strengths of our study include the geographical range from which we recruited survey participants, with all states and territories of Australia represented, spanning metropolitan, regional, and remote areas. If we applied the older Australian government system of classifying remoteness, 28% of our sample was from rural and remote areas (data not reported). Another strength was the breadth and range of perceptions we assessed quantitatively via survey, which substantially builds on the limited qualitative data that currently exist. Our study also has a number of limitations. Around half of our survey respondents were recruited via Facebook advertisements and all but one completed the survey online. Therefore, our data are likely biased toward people that are already comfortable using technology, and the perceptions of people who are less proficient with technology may differ from those of our sample. Additionally, the width of our CIs must be

<p>| Table 4: Influence of participant characteristics on interest in using a service offering physical therapist-prescribed exercise over the telephone* |
|-----------------|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Agree, no. %</th>
<th>Disagree, no. %</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-</td>
<td>-</td>
<td>1.0 (1.0–1.0)</td>
</tr>
<tr>
<td>Sex</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Female</td>
<td>184 (75)</td>
<td>63 (25)</td>
<td>0.9 (0.5–1.6)</td>
</tr>
<tr>
<td>Male</td>
<td>53 (74)</td>
<td>19 (26)</td>
<td>1.0 (reference)</td>
</tr>
<tr>
<td>Education level</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>School</td>
<td>49 (71)</td>
<td>20 (29)</td>
<td>1.3 (0.6–2.6)</td>
</tr>
<tr>
<td>Trade or trade certificate</td>
<td>35 (76)</td>
<td>11 (24)</td>
<td>1.1 (0.5–2.5)</td>
</tr>
<tr>
<td>University or tertiary degree</td>
<td>117 (79)</td>
<td>38 (24)</td>
<td>1.0 (ref)</td>
</tr>
<tr>
<td>Higher university degree</td>
<td>34 (71)</td>
<td>14 (29)</td>
<td>1.1 (0.5–2.3)</td>
</tr>
<tr>
<td>Financial situation</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Find it a strain to get by/to be careful with money</td>
<td>89 (72)</td>
<td>34 (28)</td>
<td>1.0 (reference)</td>
</tr>
<tr>
<td>Able to manage without much difficulty</td>
<td>98 (77)</td>
<td>29 (23)</td>
<td>0.8 (0.4–1.5)</td>
</tr>
<tr>
<td>Quite or very comfortably off</td>
<td>50 (76)</td>
<td>21 (24)</td>
<td>1.3 (0.6–2.6)</td>
</tr>
<tr>
<td>Affected joint</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Both</td>
<td>71 (77)</td>
<td>21 (23)</td>
<td>0.7 (0.4–1.3)</td>
</tr>
<tr>
<td>Hip</td>
<td>30 (73)</td>
<td>11 (27)</td>
<td>1.0 (0.5–2.3)</td>
</tr>
<tr>
<td>Knees</td>
<td>134 (73)</td>
<td>50 (27)</td>
<td>1.0 (reference)</td>
</tr>
<tr>
<td>Prior physical therapy interventions</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No</td>
<td>53 (75)</td>
<td>18 (25)</td>
<td>0.9 (0.5–1.7)</td>
</tr>
<tr>
<td>Yes</td>
<td>181 (73)</td>
<td>66 (27)</td>
<td>1.0 (reference)</td>
</tr>
<tr>
<td>Geographical remoteness</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Remote or very remote</td>
<td>7 (68)</td>
<td>1 (12)</td>
<td>1.0 (reference)</td>
</tr>
<tr>
<td>Inner or outer regional</td>
<td>82 (80)</td>
<td>21 (20)</td>
<td>1.8 (0.2–15.6)</td>
</tr>
<tr>
<td>Major cities</td>
<td>145 (71)</td>
<td>59 (29)</td>
<td>3.0 (0.3–25.8)</td>
</tr>
</tbody>
</table>

* Odds ratios (ORs) refer to likelihood of disagreement. 95% CI = 95% confidence interval.
Chapter 3. Perceptions of people with OA towards telerehabilitation

Table 5. Influence of participant characteristics on interest in using a service offering physical therapist-prescribed exercise via video over the internet*  

<table>
<thead>
<tr>
<th></th>
<th>Agree, no.</th>
<th>Disagree, no.</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>1.0 (1.0–1.0)</td>
<td>0.452</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>179 (72)</td>
<td>69 (28)</td>
<td>0.9 (0.5–1.6)</td>
<td>0.639</td>
</tr>
<tr>
<td>Male</td>
<td>51 (71)</td>
<td>21 (29)</td>
<td>1.0 (reference)</td>
<td>–</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School</td>
<td>45 (63)</td>
<td>26 (37)</td>
<td>1.5 (0.8–2.9)</td>
<td>0.202</td>
</tr>
<tr>
<td>Trade or trade certificate</td>
<td>32 (68)</td>
<td>15 (32)</td>
<td>1.3 (0.6–2.8)</td>
<td>0.471</td>
</tr>
<tr>
<td>University or tertiary degree</td>
<td>116 (75)</td>
<td>38 (25)</td>
<td>1.0 (reference)</td>
<td>–</td>
</tr>
<tr>
<td>Higher university degree</td>
<td>36 (77)</td>
<td>11 (23)</td>
<td>1.0 (0.4–2.2)</td>
<td>0.630</td>
</tr>
<tr>
<td>Financial situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Find it a strain to get by/to be careful with money</td>
<td>78 (63)</td>
<td>46 (37)</td>
<td>1.0 (reference)</td>
<td>–</td>
</tr>
<tr>
<td>Able to manage without much difficulty</td>
<td>103 (81)</td>
<td>25 (19)</td>
<td>0.4 (0.2–0.8)</td>
<td>0.006</td>
</tr>
<tr>
<td>Quite or very comfortably off</td>
<td>50 (71)</td>
<td>20 (29)</td>
<td>0.8 (0.4–1.7)</td>
<td>0.587</td>
</tr>
<tr>
<td>Affected joint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>73 (78)</td>
<td>21 (22)</td>
<td>0.7 (0.4–1.3)</td>
<td>0.284</td>
</tr>
<tr>
<td>Hip</td>
<td>22 (54)</td>
<td>19 (46)</td>
<td>2.5 (1.2–5.1)</td>
<td>0.014</td>
</tr>
<tr>
<td>Knee</td>
<td>133 (72)</td>
<td>51 (28)</td>
<td>1.0 (reference)</td>
<td>–</td>
</tr>
<tr>
<td>Prior physical therapy interventions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>51 (72)</td>
<td>20 (28)</td>
<td>0.9 (0.5–1.7)</td>
<td>0.699</td>
</tr>
<tr>
<td>Yes</td>
<td>177 (71)</td>
<td>71 (29)</td>
<td>1.0 (reference)</td>
<td>–</td>
</tr>
<tr>
<td>Geographical remoteness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote or very remote</td>
<td>6 (75)</td>
<td>2 (25)</td>
<td>1.0 (reference)</td>
<td>–</td>
</tr>
<tr>
<td>Inner or outer regional</td>
<td>73 (70)</td>
<td>31 (30)</td>
<td>1.4 (0.3–8.1)</td>
<td>0.713</td>
</tr>
<tr>
<td>Major cities</td>
<td>147 (72)</td>
<td>58 (28)</td>
<td>1.4 (0.2–8.1)</td>
<td>0.688</td>
</tr>
</tbody>
</table>

* Odds ratios (ORs) refer to likelihood of disagreement. 95% CI = 95% confidence interval.

noted. It is possible that replication of our study in different samples could yield higher proportions of people disagreeing with the statements. Finally, our recruitment methods meant that we had no way of knowing how many people chose not to respond to the survey, and therefore we do not know whether responders were significantly different from nonresponders.

Our study has highlighted a number of areas for future research. These include qualitative studies investigating how perceptions change after undertaking physical therapist–supervised exercise via telerehabilitation, as well as exploring reasons behind the perceptions of people with OA toward remote models of service delivery. Our survey did not assess all components of remote models of service delivery that may be important to patients, such as the development of therapeutic alliance or bond with therapists (36). Importantly, future research should also investigate the perceptions of physical therapists about telerehabilitation for people with knee OA, and whether they would be willing to deliver such a service.

In conclusion, this study found that people with knee and/or hip OA have mostly positive perceptions about telerehabilitation for providing physical therapist–prescribed exercise services. However, this study also highlights the uncertainty people have about receiving care that does not involve physical contact with a therapist. Findings from this study contribute toward future design and implementation of telerehabilitation services by better understanding why people with OA may or may not be inclined to be involved in such services.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication. Dr. Himan had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Lawford, Bennell, Himan.

Acquisition of data. Lawford.

Analysis and interpretation of data. Lawford, Bennell, Himan.

REFERENCES

Chapter 4. Physiotherapists’ perceptions of telerehabilitation

Chapter 4 Physical therapists’ perceptions of telephone and internet video-mediated service models for exercise management of people with osteoarthritis


Author contribution for this chapter are the following: study conception and design (RSH, BJL, KLB); data collection (BJL); data analysis (BJL, JK) and interpretation of data (all authors); drafting of the manuscript (BJL); critical revision of the manuscript (all authors). All authors approved the final version of the manuscript.

This study was supported by funding from the National Health & Medical Research Council (Program Grant #631717 and Centre of Research Excellence #1079078). BJL is supported by a PhD stipend from the National Health & Medical Research Council Centre of Research Excellence (#1079078). KLB is supported by a National Health & Medical Research Council Fellowship (#1058440). RSH is supported by an Australian Research Council Future Fellowship (FT130100175).
Physical Therapists’ Perceptions of Telephone- and Internet Video–Mediated Service Models for Exercise Management of People With Osteoarthritis

BELINDA J. LAWFORD,1 KIM L. BENNELL,1 JESSICA KASZA,2 AND RANA S. HINMAN1

INTRODUCTION
Osteoarthritis (OA) of the knee and hip affects around 24% and 11% of the population, respectively (1), and together are the eleventh highest contributor to global disability (2). With the aging population and increasing rates of obesity, the prevalence of OA is projected to increase substantially over the coming decades (2,3). To meet the rising public health burden, accessible and effective models of health care are needed. In this digital age, delivery of health care services via technology presents new possibilities for the future of chronic disease management (4,5).

Results. A total of 217 therapists spanning metropolitan, regional, rural, and remote Australia completed the survey. For telephone-delivered care, there was consensus agreement that it would not violate patient privacy (81% agreed/strongly agreed) and would save patient’s time (70%), but there was less than majority agreement for 10 statements. Therapists were asked to rate agreement with the other perception statements about video-delivered care, except for liking no physical contact (14%). Low confidence using internet video technologies, and inexperience with telerehabilitation, were significantly associated with reduced interest in delivering telephone and/or video-based services.

Conclusion. Physical therapists agree that telerehabilitation offers time-saving and privacy advantages for people with osteoarthritis and perceive video-delivered care more favorably than telephone-delivered services. However, most do not like the lack of physical contact with either service model. These findings may inform the implementation of telerehabilitation osteoarthritis services and the training needs of clinicians involved in delivering care.
Chapter 4. Physiotherapists’ perceptions of telerehabilitation

Significance & Innovations

- Remotely delivered health care (telerehabilitation) can increase the accessibility of physical therapy services for people with hip and/or knee osteoarthritis (OA), and increasing evidence supports the efficacy of such service delivery models, yet few are implemented beyond the research setting.
- Although people with hip and/or knee OA are willing to use telephone- and internet video-mediated service models, how physical therapists view such remotely-delivered care for this patient group is unknown, as well as whether physical therapists would be willing to deliver clinical care this way.
- Most physical therapists agree that both modes of care would save patients time and maintain patient privacy but have concerns about the lack of physical contact when consulting via telephone or video over the internet.
- Physical therapists favored internet video technologies rather than the telephone to deliver care.

(13–16), including difficulties obtaining referrals or appointments, long waiting times (17,18), and limited availability of care in some regional or remote areas (19). People with knee OA who have difficulties accessing appropriate health care often delay seeking care (20), possibly to the detriment of their symptoms. New models of physical therapy service delivery that are accessible to the wider population are needed.

Telerehabilitation is the remote provision of rehabilitation services using telecommunication technology and is supported by the Australian Physiotherapy Association (21) and American Physical Therapy Association (22) as an alternative model of service delivery. Telerehabilitation services may improve access to specialist advice for exercise management by allowing patients to consult with a physical therapist from their own home or workplace, in turn potentially reducing the costs associated with attending clinics in-person (e.g., travel, car parking, loss of earning during travel time to/from appointment, etc.). There is evidence that telerehabilitation using sophisticated videoconferencing software produces similar physical activity and functional outcomes to conventional face-to-face care in people after knee arthroplasty (23). Given that 94% of Australian households owned a computer and 86% had high-speed internet access in 2015 (24), and that software such as Skype and FaceTime are freely available, internet videoconferencing services offer potentially affordable and accessible ways in which people can consult with physical therapists to receive exercise advice. A recent Australian clinical trial has shown that exercise delivered by physical therapists via Skype, in combination with a web-based pain coping skills program, improves pain and function in people with knee OA compared to internet-delivered educational material (25). There is also preliminary evidence of the effectiveness of telephone-delivered care for people with knee OA (26).

Furthermore, the UK-based telephone service PhysioDirect (initial assessment and advice from a physical therapist prior to face-to-face therapy) is equally as clinically effective as usual physical therapy care (waiting list for face-to-face physical therapy treatment) for people with musculoskeletal conditions and provides faster access to care (27).

Although consumers with hip and/or knee OA hold positive views of, and are willing to use, telephone- and internet-video-mediated physical therapy service models (28), there are few such services available outside the research setting. For service providers and/or policy makers to effectively implement such clinical services, it is important to understand whether these models of service delivery would be acceptable, or unacceptable, to the clinicians who would deliver care. The limited research to date has investigated the perceptions and experiences of physical therapists who were involved in delivering education and exercise in the context of a clinical trial (27,29–31). These small samples of specially trained therapists, experienced in using telerehabilitation, may hold more positive perceptions about its use, which may not necessarily reflect the wider physical therapist population who are largely inexperienced with telerehabilitation. There are no studies investigating the perceptions of a broader sample of physical therapists who may be naive users of telerehabilitation. Physical therapists typically use physical touch as a way of communicating and connecting with their patients (32–34), and therapists may be uncertain about the usefulness of remote models of service delivery and/or unwilling to implement such models in their clinical setting. Therefore, the aim of this study was to investigate physical therapists’ perceptions of, and willingness to use, remotely-delivered service models for exercise management of hip and/or knee OA.

SUBJECTS AND METHODS

Study design and participants. A descriptive, cross-sectional web-based survey was undertaken. This study was approved by the University of Melbourne Research Ethics Committee. Physical therapists across Australia were recruited between February and August 2016. We wished to obtain a broad sample of physical therapists from rural and metropolitan areas, spanning both private and public practice. As it is not possible in Australia to send surveys directly to the entire population of registered physical therapists, a variety of recruitment strategies were employed to maximize generalizability of the sample. Participants were recruited by national advertisements on social media (Facebook), as well as via the Australian Physiotherapy Association monthly e-mail news bulletin to members, advertising through Australian Physiotherapy Association special interest groups, and the University of Melbourne’s clinical and research networks. Finally, physical therapists who had previously volunteered for research studies conducted by the researchers, and who had consented to be contacted for future studies, were also e-mailed an invitation to participate. Based on previous experience using these recruitment methods, we aimed to obtain at least 200
survey responses. Mandatory fields at the beginning of the survey ensured that only therapists who had current Australian registration and had treated at least 1 patient with hip and/or knee OA in the last 6 months could complete the survey.

**Survey instrument.** Physical therapists completed a survey via SurveyGizmo about their perceptions of delivering exercise over the telephone and via video over the internet (e.g., Skype, FaceTime) for people with hip and/or knee OA. Prior to completion, participants were provided

---

**Table 1. Demographic and clinical characteristics of respondents (n = 217)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>156 ± 72</td>
</tr>
<tr>
<td>Men</td>
<td>60 ± 26</td>
</tr>
<tr>
<td>Clinical experience, mean ± SD (range) years</td>
<td>15.3 ± 12.1 (0–47)</td>
</tr>
<tr>
<td>Postgraduate qualifications</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>91 ± 4</td>
</tr>
<tr>
<td>No</td>
<td>126 ± 58</td>
</tr>
<tr>
<td>Work setting</td>
<td></td>
</tr>
<tr>
<td>Public health system</td>
<td>58 ± 27</td>
</tr>
<tr>
<td>Private health system</td>
<td>129 ± 60</td>
</tr>
<tr>
<td>Both public and private</td>
<td>22 ± 10</td>
</tr>
<tr>
<td>Other</td>
<td>7 ± 3</td>
</tr>
<tr>
<td>Clinical practice, mean ± SD (range) hours/week</td>
<td>31.7 ± 12.3 (1–76)</td>
</tr>
<tr>
<td>Main focus of clinical work</td>
<td></td>
</tr>
<tr>
<td>Musculoskeletal outpatients</td>
<td>148 ± 69</td>
</tr>
<tr>
<td>Musculoskeletal inpatients</td>
<td>9 ± 4</td>
</tr>
<tr>
<td>Both musculoskeletal inpatients and outpatients</td>
<td>15 ± 7</td>
</tr>
<tr>
<td>Neurologic patients</td>
<td>5 ± 2</td>
</tr>
<tr>
<td>Other</td>
<td>39 ± 18</td>
</tr>
<tr>
<td>Geographic location of clinical practice†</td>
<td></td>
</tr>
<tr>
<td>Metropolitan city (population ≥250,000)</td>
<td>147 ± 68</td>
</tr>
<tr>
<td>Regional city/town (population 18,000 to 249,999)</td>
<td>39 ± 18</td>
</tr>
<tr>
<td>Rural town (population 5,000 to 17,999)</td>
<td>20 ± 12</td>
</tr>
<tr>
<td>Remote town (population &lt;5,000)</td>
<td>4 ± 2</td>
</tr>
<tr>
<td>Frequency of treating patients with knee/hip OA</td>
<td></td>
</tr>
<tr>
<td>Infrequently (≤1 in the last 6 months)</td>
<td>7 ± 3</td>
</tr>
<tr>
<td>Somewhat frequently (2–5 in the last 6 months)</td>
<td>29 ± 14</td>
</tr>
<tr>
<td>Frequently (≤1 patient/month)</td>
<td>54 ± 25</td>
</tr>
<tr>
<td>Very frequently (≥1 patient/week)</td>
<td>126 ± 58</td>
</tr>
<tr>
<td>Frequency of prescribing exercise for patients with hip/knee OA</td>
<td></td>
</tr>
<tr>
<td>Occasionally (to a minority of patients)</td>
<td>1 ± 1</td>
</tr>
<tr>
<td>To approximately 50% of patients</td>
<td>8 ± 4</td>
</tr>
<tr>
<td>Usually (to most patients)</td>
<td>40 ± 18</td>
</tr>
<tr>
<td>Always (to all patients)</td>
<td>167 ± 77</td>
</tr>
<tr>
<td>Previous experience with telerehabilitation</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>154 ± 71</td>
</tr>
<tr>
<td>Yes, over the phone</td>
<td>52 ± 24</td>
</tr>
<tr>
<td>Yes, via video over the internet</td>
<td>23 ± 11</td>
</tr>
<tr>
<td>Confidence using video chat service over the internet</td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>12 ± 5</td>
</tr>
<tr>
<td>A little</td>
<td>38 ± 18</td>
</tr>
<tr>
<td>Moderately</td>
<td>66 ± 31</td>
</tr>
<tr>
<td>Quite a bit</td>
<td>58 ± 27</td>
</tr>
<tr>
<td>Extremely</td>
<td>42 ± 19</td>
</tr>
<tr>
<td>Currently offer PT services by telephone</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>196 ± 92</td>
</tr>
<tr>
<td>Yes</td>
<td>18 ± 8</td>
</tr>
<tr>
<td>Currently offer PT services via internet video</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>209 ± 98</td>
</tr>
<tr>
<td>Yes</td>
<td>5 ± 2</td>
</tr>
</tbody>
</table>

* Values are the mean ± SD, unless indicated otherwise. Individual items may not add to totals due to missing data. OA = osteoarthritis; PT = physical therapy.

† City/town categories were defined according to the Australian Statistical Geography Standard Remoteness Structure (http://www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure).
with an introductory plain language statement detailing the purpose of the questionnaire. The survey (see Supplementary Appendix A, available on the *Arthritis Care & Research* website at http://onlinelibrary.wiley.com/doi/10.1002acr.23260/abstract) comprised 3 sections. Section A ascertained demographic information (e.g., sex, geographic location of the clinic) and asked about previous experience with telerehabilitation (if any). Sections B and C of the survey were adapted from some statements of the Telemedicine Perception Questionnaire (35) (items 1–10), a valid and reliable measure of perceptions about the risks and benefits of home telemedicine, and also included some custom-developed statements (items 11–16). These additional items were based on the behavior change wheel criteria (affordability, practicability, effectiveness, acceptability, safety, and equity) for designing and evaluating interventions (36). Sections B and C therefore included 16 statements each about delivering an exercise program for people with OA over the telephone (Section B), and via videoconferencing (Section C). For consistency, all statements were framed positively, and physical therapists were asked to rate their agreement with each statement on a 5-point Likert scale ranging from strongly agree to strongly disagree. A final custom-developed question ascertained appropriate fees for telehealth and video-based consultations relative to conventional consultations, rated on a 5-point Likert scale, ranging from “50% more than the cost of a face-to-face physical therapy session” to “50% less than the cost of a face-to-face physical therapy session.”

**Statistical analysis.** Data were downloaded from SurveyGizmo and processed in a Microsoft Excel spreadsheet. Data analysis was carried out with the Statistical Package for the Social Sciences, and P values less than 0.05 were considered significant. Data pertaining to statements in Sections B and C of the survey were described as number (percent), with 95% confidence intervals (95% CIs) calculated around proportions. To assess levels of agreement among therapists within each statement, we evaluated the percentage of participants who marked strongly agree or agree to each statement. Using the same approach that we adopted in previous research (38), we defined 100% as unanimity, 75–99% as consensus, 51–74% as majority view, and 0–50% as no consensus. To compare response distributions of therapist perceptions of exercise delivered over the telephone and by video over the internet, we examined the CIs for proportions who agreed/strongly agreed for each mode of service delivery. Where CIs did not overlap, we assumed that there was a significant difference in the proportions who agreed with each statement for the 2 service models.

Exploratory logistic regression models were fitted to investigate whether a physical therapist’s characteristics influenced their response to the statement “I would be interested in being involved in a service offering physical therapist-prescribed exercise over the telephone/via video over the internet for people with OA.” Therapists were classified as being either in agreement (i.e., marked strongly agree or agree) or not in agreement (i.e., marked unsure, disagree, or strongly disagree) with this statement. Univariate logistic regression models for these outcomes were fit, including each of the dependent variables of sex, work setting, geographical location of clinic, frequency of treating patients with OA, frequency of prescribing exercise for patients with OA, confidence using video internet technologies, previous experience delivering care remotely, whether or not they currently deliver care remotely for any patients, and their beliefs about the cost of telephone and video services for people with OA. Some response categories for geographical location of the clinic, frequency treating patients with OA, frequency of prescribing exercise to people with OA, and confidence using video internet technology were grouped together due to small numbers of responses in some categories.

**RESULTS**

**Characteristics of the participants.** Of the 255 people who began the survey, 217 gave complete responses (i.e., reached the end of the survey). Of these, 209 were therapists (7% did not reach the end of the survey), and 9 did not meet inclusion criteria. Therapists who gave incomplete responses were significantly less likely to have postgraduate qualifications than those who gave complete responses ($P = 0.028$ by Pearson chi-square).

The cohort (Table 1) comprised 72% women, and 60% of all participants worked exclusively in private health care, which is reflective of the Australian physical therapy workforce (where 67% of employed therapists are women, and 62% work in private practice settings [37]). Approximately one-third of therapists (32%) practiced outside of metropolitan cities, which also reflects the broader Australian physical therapy workforce (20% employed outside of major cities [38]). All but one state/territory of Australia was represented (Northern Territory). Over half of therapists (58%) treated patients with knee/hip OA very frequently, and most (77%) always prescribed exercise for these patients. A minority had previous experience with telerehabilitation, primarily in delivering care over the telephone (24%) rather than using video over the internet (11%). Although most respondents did not currently offer physical therapy services via the telephone or video in their clinical setting, a small proportion did (2–8%).

**Perceptions of telephone-delivered care.** There was consensus agreement with only 2 statements relating to telephone-delivered care (Table 2, Figure 1), which were: “A patient’s privacy would not be violated if I prescribed them an exercise program over the telephone” (81% of respondents agreed or strongly agreed), and “Receiving an exercise program from a physical therapist over the telephone would save the patient time” (76%). The majority of therapists agreed with a further 4 statements about telephone-delivered care, namely that an exercise program over the telephone would save a patient money (70%), would be an affordable way for patients to receive exercise (64%), would be a convenient form of health care for an OA patient (61%), and that physical therapists could get a good understanding of a patient’s OA over the telephone (53%). There was no consensus agreement with the remaining 10 statements. In particular, only 8% of respondents agreed that they would like the lack of physical contact when
Chapter 4. Physiotherapists’ perceptions of telerehabilitation

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Missing data, no. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise is beneficial for OA. I would get a good understanding of a patient’s OA over the ____</td>
<td>8/4 (1–6)</td>
<td>106/49 (42–56)</td>
<td>62/28 (24–35)</td>
<td>30/14 (9–19)</td>
<td>11/5 (2–8)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Telephone</td>
<td>37/17 (12–22)</td>
<td>123/57 (51–64)</td>
<td>37/17 (12–22)</td>
<td>14/7 (3–11)</td>
<td>5/2 (1–4)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>A patient’s privacy would not be violated if I prescribed them an exercise program over the ____</td>
<td>67/31 (25–38)</td>
<td>109/59 (42–57)</td>
<td>26/12 (8–17)</td>
<td>9/4 (1–7)</td>
<td>6/3 (1–5)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Telephone</td>
<td>49/23 (19–28)</td>
<td>112/52 (46–58)</td>
<td>40/18 (13–35)</td>
<td>11/7 (3–6)</td>
<td>3/1 (0–3)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Using the ____ to consult with an OA patient and prescribe an exercise program would be easy for me.</td>
<td>10/5 (2–9)</td>
<td>55/25 (21–32)</td>
<td>77/35 (29–42)</td>
<td>56/26 (21–32)</td>
<td>17/8 (5–12)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Telephone</td>
<td>25/12 (7–16)</td>
<td>111/51 (47–58)</td>
<td>56/26 (21–32)</td>
<td>14/6 (4–10)</td>
<td>8/4 (2–7)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>I would be as satisfied talking to an OA patient over the ____ as I would be talking to the patient in person in my consulting room.</td>
<td>12/5 (2–9)</td>
<td>53/24 (19–30)</td>
<td>34/16 (11–21)</td>
<td>69/41 (34–48)</td>
<td>28/13 (8–18)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Telephone</td>
<td>30/14 (9–18)</td>
<td>93/43 (37–50)</td>
<td>39/18 (13–23)</td>
<td>42/19 (14–25)</td>
<td>14/6 (3–10)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>An exercise program prescribed by a PT over the ____ would improve a patient’s OA.</td>
<td>9/4 (2–7)</td>
<td>85/39 (33–46)</td>
<td>97/45 (38–51)</td>
<td>15/7 (4–10)</td>
<td>9/5 (2–7)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Telephone</td>
<td>31/14 (10–19)</td>
<td>120/56 (50–62)</td>
<td>51/24 (18–30)</td>
<td>9/4 (2–7)</td>
<td>5/2 (1–5)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>An exercise program prescribed by a PT over the ____ would save a patient money.</td>
<td>31/14 (11–19)</td>
<td>120/56 (49–62)</td>
<td>46/21 (16–27)</td>
<td>15/7 (4–11)</td>
<td>4/2 (0–4)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Telephone</td>
<td>29/13 (9–18)</td>
<td>114/55 (46–62)</td>
<td>52/24 (19–29)</td>
<td>13/6 (3–9)</td>
<td>4/2 (1–4)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>An exercise program prescribed by a PT over the ____ would be a convenient form of health care for an OA patient.</td>
<td>5/2 (1–4)</td>
<td>72/33 (28–39)</td>
<td>64/26 (24–35)</td>
<td>58/27 (20–33)</td>
<td>17/8 (5–12)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Telephone</td>
<td>24/11 (7–15)</td>
<td>118/51 (44–57)</td>
<td>50/23 (18–29)</td>
<td>23/11 (7–15)</td>
<td>9/4 (2–7)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>I like that there would be no physical contact with an OA patient when consulting over the ____</td>
<td>4/2 (1–4)</td>
<td>13/6 (3–10)</td>
<td>25/11 (7–16)</td>
<td>112/54 (47–61)</td>
<td>57/26 (21–33)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Telephone</td>
<td>5/2 (1–4)</td>
<td>25/12 (7–16)</td>
<td>32/15 (10–20)</td>
<td>120/55 (48–63)</td>
<td>34/16 (11–21)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Receiving an exercise program from a PT over the ____ would save the patient time.</td>
<td>19/9 (5–13)</td>
<td>113/52 (46–60)</td>
<td>53/24 (20–31)</td>
<td>20/9 (6–14)</td>
<td>10/3 (2–8)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Telephone</td>
<td>46/21 (16–27)</td>
<td>129/59 (54–67)</td>
<td>27/13 (9–16)</td>
<td>7/3 (1–6)</td>
<td>5/3 (1–5)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Receiving an exercise program from a PT over the ____ would save the patient time.</td>
<td>31/14 (10–20)</td>
<td>136/62 (58–70)</td>
<td>27/13 (8–17)</td>
<td>18/9 (5–12)</td>
<td>3/1 (0–3)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Telephone</td>
<td>44/20 (15–27)</td>
<td>134/62 (57–68)</td>
<td>24/11 (7–16)</td>
<td>9/4 (2–7)</td>
<td>4/2 (1–4)</td>
<td>2 (1)</td>
</tr>
</tbody>
</table>

Continued
consulting over the telephone. Most therapists (76%) believed that a telephone consultation should cost the same or 25% less than the cost of a face-to-face session, although 20% believed that it should cost 50% less (Table 3).

Perceptions about video-delivered care. Fifteen of 16 statements about video-delivered care (Table 2, Figure 1) reached at least majority agreement (~50% of respondents in agreement), 3 of which reached consensus agreement (75–99% of respondents in agreement). Statements for which there was consensus agreement related to video-based care saving the patient time (82% agreed or strongly agreed), being a convenient form of health care for an OA patient (80%), and not violating a patient’s privacy (75%). Only 1 statement about video-based care failed to reach at least majority agreement, where only 14% of respondents agreed or strongly agreed that they liked that there would be no physical contact when consulting via video. Similar to telephone-based care, most therapists (85%) believed a video consultation should cost the same or 25% less than the cost of a face-to-face session (Table 3).

Physical therapists displayed a preference for video-delivered care, with significantly more therapists being in agreement with 10 of 16 statements relating to video-delivered care compared to telephone-based care. These included the statements regarding getting an understanding of a patient’s OA (74% [95% CI 68–80] agreement for video versus 53% [95% CI 46–60] for telephone), being easy to use (63% [95% CI 57–69] versus 39% [95% CI 24–36], respectively), being as satisfied as consulting in-person (57% [95% CI 51–63] versus 29% [95% CI 24–36]), improving a patient’s OA (70% [95% CI 62–75] versus 43% [95% CI 37–50]), being able to adequately monitor a patient’s OA (62% [95% CI 55–69] versus 35% [95% CI 29–41]), being convenient for an OA patient (60% [95% CI 56–64] versus 61% [95% CI 55–67]), being acceptable (62% [95% CI 55–66] versus 41% [95% CI 34–48]), being useful (practical) (68% [95% CI 60–72] versus 42% [95% CI 36–50]), and being effective (51% [95% CI 45–57] versus 28% [95% CI 18–38]).
Chapter 4. Physiotherapists’ perceptions of telerehabilitation

Therapist Perceptions of Remote Service Delivery for OA

Figure 1. Percentage of survey respondents who agree or strongly agree with perception statements relating to telerehabilitation. PT = physical therapist; OA = osteoarthritis.

CI 45–58% versus 23% [95% CI 18–29%], and being safe (55% [95% CI 49–61%] versus 26% [95% CI 19–31%]).

Characteristics influencing interest in delivering telerehabilitation. Only 1 independent variable was associated with interest in delivering telephone services (Table 4).

Having low confidence using internet video technologies was associated with reduced odds of being interested in providing telephone-delivered care, relative to being quite confident (odds ratio [OR] 0.4 [95% CI 0.2–0.8]). For video-based care, 2 independent variables were significantly associated with interest in delivering such services, with another reaching border-line significance (Table 5). Being not at all, or a little, confident using video internet technologies, relative to quite confident (OR 0.2 [95% CI 0.1–0.6]) and having no previous experience delivering telehealthcare, relative to having previous experience (OR 0.4 [95% CI 0.2–0.8]), were both associated with decreased odds of having an interest in providing video-delivered care.

**DISCUSSION**

This study aimed to investigate the perceptions of physical therapists about the remote delivery of exercise therapy for people with knee and/or hip OA. For both video- and telephone-delivered services, there was consensus agreement among our sample of physical therapists that both would save patients time, and maintain patient privacy, but few agreed that they would like the lack of physical contact with patients. Overall, physical therapists held more positive perceptions of video-delivered care compared to telephone care, with more than half of all attitude statements about telephone care failing to achieve majority agreement.

---

**Table 3. Therapists’ perceptions of telerehabilitation costs for exercise management of patients with knee and/or hip osteoarthritis, compared with face-to-face PT session (n = 217)**

<table>
<thead>
<tr>
<th>Cost perception</th>
<th>Telephone</th>
<th>Internet video</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% more</td>
<td>2/1 (0–3)</td>
<td>3/1 (0–3)</td>
</tr>
<tr>
<td>25% more</td>
<td>7/3 (1–6)</td>
<td>12/6 (3–9)</td>
</tr>
<tr>
<td>Same</td>
<td>85/39 (33–46)</td>
<td>105/40 (42–56)</td>
</tr>
<tr>
<td>25% less</td>
<td>80/37 (31–44)</td>
<td>78/36 (36–43)</td>
</tr>
<tr>
<td>50% less</td>
<td>42/29 (15–26)</td>
<td>18/8 (6–13)</td>
</tr>
<tr>
<td>Missing data, no. (%)</td>
<td>1 (0)</td>
<td>1 (0)</td>
</tr>
</tbody>
</table>

* Values are the number/percentage (95% confidence interval) unless indicated otherwise. PT = physical therapist; OA = osteoarthritis.
Table 4. Influence of therapist characteristics on interest in offering physical therapist-prescribed exercise over the telephone for knee or hip OA

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Disagree</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>64 (41)</td>
<td>92 (59)</td>
<td>0.7 (0.4-1.2)</td>
<td>0.16</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>31 (52)</td>
<td>29 (48)</td>
<td>1.0 (ref.)</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private practice</td>
<td>62 (48)</td>
<td>67 (52)</td>
<td>1.6 (0.9-3.1)</td>
<td>0.13</td>
</tr>
<tr>
<td>Public practice</td>
<td>21 (36)</td>
<td>37 (64)</td>
<td>1.0 (ref.)</td>
<td>–</td>
</tr>
<tr>
<td>Combination public and private</td>
<td>11 (50)</td>
<td>11 (50)</td>
<td>1.0 (0.7-4.8)</td>
<td>0.26</td>
</tr>
<tr>
<td>Other</td>
<td>2 (29)</td>
<td>5 (71)</td>
<td>0.7 (0.1-4.0)</td>
<td>0.69</td>
</tr>
<tr>
<td>Geographical location of clinic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural town/remote town</td>
<td>14 (47)</td>
<td>16 (53)</td>
<td>1.2 (0.6-2.7)</td>
<td>0.60</td>
</tr>
<tr>
<td>Regional town/city</td>
<td>20 (51)</td>
<td>19 (49)</td>
<td>1.5 (0.7-3.0)</td>
<td>0.28</td>
</tr>
<tr>
<td>Metropolitan city</td>
<td>61 (42)</td>
<td>86 (58)</td>
<td>1.0 (ref.)</td>
<td>–</td>
</tr>
<tr>
<td>Frequency of treating patients with knee/hip OA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrequently/somewhat frequently</td>
<td>13 (36)</td>
<td>23 (64)</td>
<td>0.7 (0.3-1.6)</td>
<td>0.34</td>
</tr>
<tr>
<td>Frequently</td>
<td>25 (46)</td>
<td>29 (54)</td>
<td>1.0 (ref.)</td>
<td>–</td>
</tr>
<tr>
<td>Very frequently</td>
<td>57 (45)</td>
<td>69 (55)</td>
<td>1.0 (0.5-1.8)</td>
<td>0.90</td>
</tr>
<tr>
<td>Frequency of prescribing exercise for patients with hip and/or knee OA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasionally to approximately 50%</td>
<td>4 (44)</td>
<td>5 (56)</td>
<td>1.1 (0.3-4.6)</td>
<td>0.92</td>
</tr>
<tr>
<td>Usually, to most patients</td>
<td>17 (43)</td>
<td>23 (57)</td>
<td>1.0 (ref.)</td>
<td>–</td>
</tr>
<tr>
<td>Always, to all patients</td>
<td>74 (44)</td>
<td>93 (56)</td>
<td>1.0 (0.5-2.2)</td>
<td>0.64</td>
</tr>
<tr>
<td>Confidence using video internet technologies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all/a little</td>
<td>14 (28)</td>
<td>36 (72)</td>
<td>0.4 (0.2-0.8)</td>
<td>0.01</td>
</tr>
<tr>
<td>Moderately</td>
<td>32 (49)</td>
<td>34 (52)</td>
<td>0.9 (0.4-1.8)</td>
<td>0.72</td>
</tr>
<tr>
<td>Quite a bit</td>
<td>30 (52)</td>
<td>29 (48)</td>
<td>1.0 (ref.)</td>
<td>–</td>
</tr>
<tr>
<td>Extremely</td>
<td>19 (45)</td>
<td>23 (55)</td>
<td>0.8 (0.3-1.7)</td>
<td>0.52</td>
</tr>
<tr>
<td>Previous experience delivering care via telerehabilitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>62 (40)</td>
<td>92 (60)</td>
<td>0.6 (0.3-1.1)</td>
<td>0.08</td>
</tr>
<tr>
<td>Yes, either over the telephone or via video</td>
<td>33 (53)</td>
<td>29 (47)</td>
<td>1.0 (ref.)</td>
<td>–</td>
</tr>
<tr>
<td>Currently providing care via telephone or internet video</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>63 (43)</td>
<td>112 (57)</td>
<td>0.6 (0.2-1.4)</td>
<td>0.21</td>
</tr>
<tr>
<td>Yes, either over the telephone or via video</td>
<td>12 (57)</td>
<td>9 (43)</td>
<td>1.0 (ref.)</td>
<td>–</td>
</tr>
<tr>
<td>Belief about cost of telephone-delivered care</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-50% more than face-to-face</td>
<td>2 (100)</td>
<td>0 (0)</td>
<td>0.8 (0.2-3.5)</td>
<td>0.80</td>
</tr>
<tr>
<td>Same as face-to-face</td>
<td>32 (38)</td>
<td>53 (62)</td>
<td>1.0 (ref.)</td>
<td>–</td>
</tr>
<tr>
<td>25% less than face-to-face</td>
<td>42 (53)</td>
<td>38 (47)</td>
<td>1.8 (1.0-3.4)</td>
<td>0.06</td>
</tr>
<tr>
<td>50% less than face-to-face</td>
<td>18 (43)</td>
<td>24 (57)</td>
<td>1.2 (0.6-2.6)</td>
<td>0.57</td>
</tr>
</tbody>
</table>

* Values are the number (%) unless indicated otherwise. OA = osteoarthritis; OR = odds ratio. 95% CI = 95% confidence interval.

confidence using internet video technologies, and having no prior experience with telerehabilitation, were significantly associated with reduced interest in delivering either telephone and/or video-based services.

Overall, physical therapists in our study appeared to hold positive perceptions about using internet video technologies to deliver care to people with OA. Therapists were in majority agreement with 15 of 16 perception statements, with more than 75% agreeing that such services would be time-saving, privacy-protecting, and convenient for people with OA. These findings broadly reflect previous quantitative studies investigating physical therapists’ satisfaction with using sophisticated videoconferencing software to deliver care to people who have undergone total knee arthroplasty in research settings (29,30,39,40). Collectively, these previous studies found therapists were satisfied with the patient-therapist relationship and attainment of therapeutic goals (41) as well as the convenience and usefulness of video-delivery (40). While physical therapists in previous studies believed that the video technology was easy and safe to use (29,30), more than one-third (37-45%) of our survey sample did not agree that using video technologies to deliver care would be easy, or that it would be a safe way for patients to receive an exercise program. This result might be because only 11% of our cohort had any previous experience delivering video-based care, in contrast to the prior studies where physical therapists had first-hand experiences to reflect upon. Therapists’ perceptions about video-delivered care align with those of people with OA (28), who achieved consensus agreement that video-based care would be time-saving, convenient, and easy to use, and would protect their privacy.

Although most physical therapists also agreed telephone-delivered care would maintain a patient’s privacy and save the patient time, fewer therapists agreed with the other perception statements, relative to video. To our knowledge, no other studies have investigated the perceptions physical therapists have toward telephone-delivery of exercise therapy for people with OA. A recent survey found that physical therapists and general practitioners in the UK have overall positive attitudes...
### Table 3. Influence of therapist characteristics on interest in offering physical therapist-prescribed exercise via internet video for knee or hip OA*  

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Disagree</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>85 (56)</td>
<td>68 (44)</td>
<td>0.8 (0.4–1.4)</td>
<td>0.42</td>
</tr>
<tr>
<td>Men</td>
<td>37 (62)</td>
<td>23 (38)</td>
<td>1.0 (ref.)</td>
<td></td>
</tr>
<tr>
<td><strong>Work setting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private practice</td>
<td>79 (62)</td>
<td>49 (38)</td>
<td>1.5 (0.8–2.8)</td>
<td>0.21</td>
</tr>
<tr>
<td>Public practice</td>
<td>25 (52)</td>
<td>27 (48)</td>
<td>1.0 (ref.)</td>
<td></td>
</tr>
<tr>
<td>Combination public and private</td>
<td>13 (59)</td>
<td>9 (41)</td>
<td>1.3 (0.5–3.7)</td>
<td>0.56</td>
</tr>
<tr>
<td>Other</td>
<td>2 (29)</td>
<td>5 (71)</td>
<td>0.4 (0.1–2.1)</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>Geographical location of clinic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural town/remote town</td>
<td>18 (62)</td>
<td>11 (38)</td>
<td>0.8 (0.3–1.7)</td>
<td>0.50</td>
</tr>
<tr>
<td>Regional town/city</td>
<td>24 (62)</td>
<td>15 (39)</td>
<td>1.0 (0.4–2.6)</td>
<td>0.96</td>
</tr>
<tr>
<td>Metropolitan city</td>
<td>80 (55)</td>
<td>65 (45)</td>
<td>1.0 (ref.)</td>
<td></td>
</tr>
<tr>
<td><strong>Frequency of treating patients with knee/hip OA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrequently/somewhat frequently</td>
<td>20 (57)</td>
<td>15 (43)</td>
<td>1.1 (0.5–2.5)</td>
<td>0.66</td>
</tr>
<tr>
<td>Frequently</td>
<td>30 (56)</td>
<td>24 (44)</td>
<td>1.0 (ref.)</td>
<td></td>
</tr>
<tr>
<td>Very frequently</td>
<td>72 (58)</td>
<td>52 (42)</td>
<td>1.1 (0.9–2.1)</td>
<td>0.76</td>
</tr>
<tr>
<td><strong>Frequency of prescribing exercise for patients with hip and/or knee OA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasionally to approximately 50%</td>
<td>4 (44)</td>
<td>5 (56)</td>
<td>1.0 (0.2–4.5)</td>
<td>0.96</td>
</tr>
<tr>
<td>Usually, to most patients</td>
<td>17 (44)</td>
<td>22 (56)</td>
<td>1.0 (ref.)</td>
<td></td>
</tr>
<tr>
<td>Always, to all patients</td>
<td>101 (61)</td>
<td>64 (39)</td>
<td>2.0 (1.0–4.1)</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>Confidence using video internet technologies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all/a little</td>
<td>17 (35)</td>
<td>31 (65)</td>
<td>0.2 (0.1–0.6)</td>
<td>≤0.001</td>
</tr>
<tr>
<td>Moderately</td>
<td>40 (62)</td>
<td>25 (38)</td>
<td>0.7 (0.3–1.5)</td>
<td>0.39</td>
</tr>
<tr>
<td>Quite a bit</td>
<td>46 (69)</td>
<td>18 (31)</td>
<td>1.0 (ref.)</td>
<td></td>
</tr>
<tr>
<td>Extremely</td>
<td>25 (60)</td>
<td>17 (41)</td>
<td>0.7 (0.3–1.5)</td>
<td>0.33</td>
</tr>
<tr>
<td><strong>Previous experience delivering care via telerehabilitation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>79 (52)</td>
<td>74 (48)</td>
<td>0.4 (0.2–0.8)</td>
<td>0.01</td>
</tr>
<tr>
<td>Yes, over the phone or via video</td>
<td>43 (72)</td>
<td>17 (28)</td>
<td>1.0 (ref.)</td>
<td></td>
</tr>
<tr>
<td><strong>Currently providing care via telephone or internet video</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>108 (56)</td>
<td>84 (44)</td>
<td>0.6 (0.2–1.7)</td>
<td>0.36</td>
</tr>
<tr>
<td>Yes, either over the telephone or via video</td>
<td>14 (67)</td>
<td>7 (33)</td>
<td>1.0 (ref.)</td>
<td></td>
</tr>
<tr>
<td><strong>Beliefs about the cost of video-delivered care</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25–50% more than face-to-face</td>
<td>2 (67)</td>
<td>1 (33)</td>
<td>1.4 (0.5–4.1)</td>
<td>0.58</td>
</tr>
<tr>
<td>Same as face-to-face</td>
<td>55 (52)</td>
<td>50 (48)</td>
<td>1.0 (ref.)</td>
<td></td>
</tr>
<tr>
<td>25% less than face-to-face</td>
<td>47 (63)</td>
<td>28 (37)</td>
<td>1.5 (0.8–2.8)</td>
<td>0.17</td>
</tr>
<tr>
<td>50% less than face-to-face</td>
<td>11 (61)</td>
<td>7 (39)</td>
<td>1.4 (0.5–4.0)</td>
<td>0.49</td>
</tr>
</tbody>
</table>

* Values are the number (%) unless indicated otherwise. OA = osteoarthritis. OR = odds ratio; 95% CI = 95% confidence interval.

Although there is some evidence that telephone-delivered physical therapist advice and management for people with musculoskeletal conditions (27), including OA (26), is as effective as usual care, therapists in our study did not reach majority agreement on statements relating to the acceptability, effectiveness, usefulness, and safety of this delivery mode. While general practitioners and physical therapists who were surveyed about PhysioDirect held overall positive attitudes about the service, the majority believed that most patients would still need to be seen face-to-face (42). This belief is despite a pragmatic randomized controlled trial showing that PhysioDirect is equally clinically effective, compared with usual waiting list–based care, provides faster access to treatment, and appears to be safe and acceptable to patients (27). Qualitative interviews with PhysioDirect therapists revealed that, before delivering the service, many held concerns about accurately diagnosing patients and communicating effectively via telephone (27). There is also evidence that general practitioners experience dissatisfaction when consulting with patients via telephone, being concerned towards the physical therapist-delivered telephone service PhysioDirect, which is run by the National Health Service and provides initial assessment and advice to people with musculoskeletal conditions (42). However, their survey comprised only 6 items and did not capture clinician’s beliefs about the specific advantages or disadvantages of telephone-delivered care. Qualitative interviews with PhysioDirect therapists revealed that most would be interested in delivering a similar service in the future, believing that it was a valuable service that can reduce patient waiting times (27). Interestingly, people with hip and/or knee OA hold more positive perceptions of telephone-delivered physical therapist-prescribed exercise (26) than the physical therapists in our sample. Our prior research showed at least majority agreement among people with OA, with 13 of 17 perception statements (76%), while therapists reached majority agreement on only 6 of 16 statements (38%). Why these differences exist is not clear from our survey, and thus further qualitative explorations are necessary.
about the absence of visual cues and being unable to confirm the diagnosis with an examination (43), and possibly our physical therapists hold similar concerns.

Less than 15% of therapists agreed that they would like the lack of physical contact with patients when consulting via video or telephone, which also broadly reflects the perceptions of people with OA (28). It is not clear why therapists feel this way, given that self-management advice and exercise are the recommended core components of physical therapy for all people with OA, and that manual therapies are only recommended as adjunct treatments for some patients (44). As physical therapy is traditionally regarded as a hands-on profession (45), and as physical therapists frequently use touch to communicate with and connect to their patients (32–34), therapists may feel their usual communication style will be hampered by telerehabilitation. Therapists’ negative perceptions about the lack of physical contact may also reflect the fact that they are not traditionally trained to provide care remotely, and so may not feel confident in being able to deliver care safely and effectively. Our data support this conclusion, as we found that no experience with telerehabilitation was associated with decreased odds of having an interest in providing video-delivered care, and that low confidence using internet video technologies was associated with decreased odds of having an interest in providing both telephone and video-delivered services. This suggests that many physical therapists may require specific training, and practice, in providing telerehabilitation care. In fact, physical therapists who deliver care via the PhysioDirect telephone service are required to complete specialized training to become proficient in assessing patients and providing care remotely (46). Future studies should investigate the reasons why physical therapists are uncomfortable about the lack of physical contact with telerehabilitation, and whether these perceptions can be shifted following specialized training in the remote delivery of care. Surprisingly, as many as 8–14% of respondents agreed that they would like the lack of physical contact when consulting via telerehabilitation. Although this finding could reflect misinterpretation of the positively framed survey statements, it may also indicate that not all therapists like physical contact with patients, perhaps due to occupational hazards (thumb pain) of manual therapy techniques (47,48).

Strengths of the current study include the number of physical therapists who completed the survey, who were recruited Australia-wide, representing all but one state/territory, and spanned clinical practice in metropolitan cities as well as rural towns. Our respondents were generalizable to the broader Australian physical therapy workforce, where 67% of employed physical therapists are female, 62% work in private practice (57), and 80% are employed in major cities (38). Other strengths include the broad range of attitude statements relating to both telephone and video modes of delivery, as well as explorations of the characteristics that influenced interest in delivering these services. Our study also had a number of limitations. Our survey data were collected in Australia, thus findings may not be generalizable to other countries where physical therapists may have more exposure to telerehabilitation services. Our recruitment methods meant that we had no information about response rate, and so we do not know whether responders were significantly different from non-responders. We note that our method of using overlap of CIs to ascertain whether there were significant differences between perceptions of telephone and video-based care is conservative, and that significant differences may exist even with overlapping confidence intervals (49). We only surveyed physical therapists, and future research should investigate the perceptions of other providers of exercise management for people with OA (e.g., exercise physiologists), as they may hold more favorable perceptions of telerehabilitation service models.

In conclusion, physical therapists agree that telerehabilitation offers time-saving and privacy advantages for people with OA, and perceive video-delivered care more favorably than telephone-delivered services. However, most do not like the lack of physical contact with either service model. Low confidence using internet video technologies, and having no prior experience with telerehabilitation, were significantly associated with reduced interest in delivering either telephone and/or video-based services. These findings contribute towards the development and implementation of future telerehabilitation services for people with hip/knee OA.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication. Dr. Hinman had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Lawford, Bennell, Kasza, Hinman.

Acquisition of data. Lawford.

Analysis and interpretation of data. Lawford, Bennell, Kasza, Hinman.

REFERENCES

Chapter 4. Physiotherapists’ perceptions of telerehabilitation


Chapter 5 Telecare trial methods

This chapter briefly summarises the methodology of the ‘Telecare’ randomised controlled trial, which is integral to the methodology of the subsequent four chapters. The trial protocol has been published elsewhere (Hinman et al., 2017b) and the trial is due for completion in late 2018. The aim of the trial is to determine the effectiveness of incorporating exercise advice and behaviour change support by physiotherapists into an existing Australian nurse-led musculoskeletal telephone service for adults with knee OA.

5.1 Design

The Telecare trial is a two-armed parallel-group pragmatic superiority randomised controlled trial. Participant flow through the trial is shown in Figure 5.1.

5.2 Participants

One hundred and seventy-five people with knee OA were recruited across all states of Australia via advertisements through consumer organisations, social media (e.g. Facebook), community locations, medical clinics, radio, newspapers, and through a previous volunteer database. Participants from metropolitan, regional, rural, and remote areas of Australia were recruited. Volunteers underwent screening online and via telephone to ensure eligibility.

Eligibility criteria included those who met the National Institute for Health and Care Excellence OA clinical criteria (National Institute for Health and Care Excellence, 2014) (i.e. being aged 45 years and over; having activity-related joint pain, and having morning stiffness ≤30 minutes), had average knee pain ≥4 on 11-point numeric rating scale (where
0 = no pain, 10 = worst pain possible) in the past week, and a history of knee pain for at least three months.

Figure 5.1. Participant flow through the randomised controlled trial. Taken from Hinman et al. (2017b).
Briefly, exclusion criteria included: i) being on the waiting list for a knee or hip replacement, or planning any lower limb or spinal surgery in the next 12 months; ii) having had a knee joint replacement in the affected knee; iii) having undergone knee arthroscopy in the prior three months; iv) unable to speak or read English; v) unable to use/access a telephone; vi) self-reported diagnosis of rheumatoid arthritis; vii) any neurological condition that affects the lower limbs; viii) any cardiovascular condition; ix) inability to safely participate in moderate-intensity exercise, and; x) unable to commit to the study for 12 months.

Eight musculoskeletal physiotherapists were recruited to deliver the intervention. Eligible physiotherapists were located in Victoria, Australia, working in private and/or public practice, having at least two years of musculoskeletal clinical experience and current Australian registration to practice. Physiotherapists were recruited using advertisements in the research team’s clinical networks.

5.3 Randomisation and blinding

After baseline assessment, participants were randomly allocated to either usual care or the intervention group. Randomisation was by random permuted blocks of size from 6 to 12 and stratified by gender. Participants who were randomised to the intervention group were also randomly assigned to one of eight trial physiotherapists by permuted blocks of size 16. To conceal group allocation, a researcher who was not involved in recruitment or outcome assessment accessed the randomisation schedule via a password protected computer program.
Participants were blinded to study hypotheses and informed that the trial compared two different forms of telephone-delivered support and advice for self-management of knee OA which would be provided by qualified healthcare professionals. The qualifications of these healthcare professionals was not disclosed to participants so that questionnaire responses were not influenced by knowledge of the other treatment group.

5.4 Usual care

Participants allocated to the usual care group received an initial telephone call from a registered nurse from the Musculoskeletal Help Line administered by MOVE-muscle, bone & joint health (Victoria, Australia). The nurse provided verbal information about OA and common management strategies, assistance navigating healthcare and social services, emotional support and advice, and linkages to community resources. Participants may have also been mailed written information or referral to consumer or organisational website. This telephone call lasted approximately 25-45 minutes and participants may have received follow-up advice from the nurse if desired. Prior to this telephone call, participants were sent (via email or post) an information sheet about self-management topics they may wish to discuss.

5.5 Intervention

In addition to a nurse telephone call, participants who were allocated to the intervention arm of the trial also received between five and 10 telephone calls from one of the Telecare physiotherapists over a period of six months. Prior to the first physiotherapist call, participants were asked to complete a pre-treatment survey which collected information about their clinical history, knee symptoms, physical limitations, and personal goals. During the initial call (approximately 45 minutes duration) physiotherapists
clarified/explored the information provided in the pre-treatment survey. Physiotherapists used a person-centred approach to care and collaboratively devised personalised self-management goals and an action plan that included a structured strengthening exercise program and physical activity plan. During subsequent calls (approximately 20 minutes duration) physiotherapists monitored progress, reviewed goals, and adjusted the exercise or physical activity program accordingly. Physiotherapists also helped to increase participants’ knowledge and understanding of knee OA and the benefits of exercise, and also worked to increase motivation to exercise and helped the participant incorporate exercise into their daily life.

Participants were provided with a resource folder containing information about OA, the role and benefits of exercise and physical activity, and the importance of motivation, as well as a personal goal/action plan worksheet. The folder also contained written exercise instructions along with photo demonstrations of each exercise, a health diary to record exercise adherence and knee symptoms, and access to a study website containing video demonstrations of each exercise. All participants were also provided with three exercise resistance bands for their strengthening exercises. Study physiotherapists were also provided with an identical information folder to refer to during consultations.

For the strengthening exercise program, physiotherapists chose from exercises shown in Table 5.1. They aimed to prescribe between five and six exercises, with the exact number to be negotiated between the participant and physiotherapist, to be completed three times per week. The precise number of sets and repetitions of exercises was left up to each physiotherapist, based on the participant’s clinical history and functional ability, as well as their short- and long-term goals. Physiotherapists were also asked to prescribe a dosage
that felt ‘hard’ to ‘very hard’ to perform. Physiotherapists also prescribed a general physical activity plan for participants that aimed to increase their general and incidental levels of physical activity, according to individual needs and goals. Physiotherapists encouraged their participants to record their strengthening exercise and physical activity programs in their self-management plan and health diary.

During each telephone consultation, physiotherapists completed online treatment notes, including details about call duration, topics discussed, clinical history, personal motivators, prescribed exercises and physical activity, plans to facilitate adherence, and a rating of their confidence to carry out the agreed action plan. Prior to the start of the trial, all eight physiotherapists were required to complete an intensive training program in behaviour change techniques and person-centred practices, which is further described in the subsequent two chapters.
### 1. Quadriceps strengthening (Aim to include two exercises)

<table>
<thead>
<tr>
<th>Exercise Type</th>
<th>Exercise</th>
<th>Indications</th>
<th>Progression</th>
<th>Step back</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee extension</td>
<td>A. Seated knee extension (with resistance band) with 5 second hold</td>
<td>Indications: suitable first line exercise  Progression: increase exercise band resistance (red then green then blue then black).  Step back: reduce resistance level of band or eliminate band</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. Inner range quadriceps over roll with 5 second hold</td>
<td>Indications: Usually only required when any flare ups with seated knee extension (1A)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exercise Type</th>
<th>Exercise</th>
<th>Indications</th>
<th>Progression</th>
<th>Step back</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sit-to-stand</td>
<td>C. Sit-to-stand without using hands</td>
<td>Indications: suitable first line exercise  Progression: reduce chair height, hover above the seat without touching down, more weight on affected leg, split leg position (affected leg closer to seat)  Step back: allow use of upper limbs to assist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steps</td>
<td>D. Step-ups</td>
<td></td>
<td>Indications: suitable progression from sit-to-stand (1C)  Progression: increase step height, hold weight (eg in hands or in backpack)  Step back: reduce step height, or resume sit-to-stand (1C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E. Forward touch-downs from a step</td>
<td>Indications: suitable progression from step-ups (1D)  Progression: increase step height, hold weight (eg in hands or backpack), lower foot without touching down  Step back: step-ups (1D)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exercise Type</th>
<th>Exercise</th>
<th>Indications</th>
<th>Progression</th>
<th>Step back</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial squats</td>
<td>F. Partial wall squats</td>
<td>Indications: suitable progression from sit-to-stand (1C)  Progression: increase hold time to 5 seconds, increase weight on study limb  Step back: in case of flares/difficulty, resume sit-to-stand (1C)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2. Hip abductor strengthening (Aim to include one exercise)

<table>
<thead>
<tr>
<th>Exercise Type</th>
<th>Exercise</th>
<th>Indications</th>
<th>Progression</th>
<th>Step back</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing hip abduction</td>
<td>A. Side leg raises with resistance band in standing</td>
<td>Indications: suitable first line exercise  Progression: increase exercise band resistance (red then green then blue then black), increase hold time  Step back: reduce resistance level of band or eliminate band</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. Crab walk with resistance band</td>
<td>Indications: good progression from standing leg side raises (2A)  Progression: increase exercise band resistance (red then green then blue then black)  Step back: reduce resistance level of band, or resume side leg raises in standing (2A)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3. Standing hip abduction

- **Indications**: good progression from crab walking (2B), and for variety at final session
- **Progression**: hold weight (eg in hands or backpack)
- **Step back**: resume exercise 2A or 2B. Use cautiously in those with knee instability/malalignment.

#### C. Wall push (hip abduction with flexed hip/knee) for 20 seconds, standing on study limb

**Indications**: good progression from crab walking (2B), and for variety at final session

**Progression**: hold weight (eg in hands or backpack)

**Step back**: resume exercise 2A or 2B. Use cautiously in those with knee instability/malalignment.

### 3. Hamstring strengthening (Aim for one exercise)

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Description</th>
<th>Progression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing knee flexion</td>
<td>Standing over bench, knee curls with or without resistance</td>
<td>Increase exercise band resistance (red then green then blue then black). Reduce resistance level of exercise band, or eliminate band.</td>
</tr>
<tr>
<td>Standing plantar-flexion</td>
<td>Double-leg heel raises</td>
<td>Single heel raises, raises from the edge of a step.</td>
</tr>
</tbody>
</table>

### 4. Calf strengthening (Aim for one exercise)

- **Progression**: increase exercise band resistance (red then green then blue then black).
- **Step back**: reduce resistance level of exercise band, or eliminate band.

### 4. Optional extras. Choose an extra exercise from any of those listed above, or one from the list below, if required:

#### A. Quadriceps/hip/trunk strength/stability

- **Progression**: increase squat depth, increase hold time, increase weight on study limb, single limb only

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled squats with trunk extension, holding onto a chair</td>
<td></td>
</tr>
</tbody>
</table>

#### B. Hip mobility/stretch

- **Progression**: increase lunge depth

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep lunges holding onto back of chair/bench</td>
<td></td>
</tr>
</tbody>
</table>

#### C. Hip extensor strengthening

- **Progression**: increase hold time, asymmetrical leg bridge, single-leg bridge, single-leg bridge with contralateral leg raised

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-leg bridging in supine</td>
<td></td>
</tr>
</tbody>
</table>
5.6 Outcomes

Although beyond the scope of this thesis, the primary and secondary outcomes used in the trial will be briefly described here. Participant descriptive data was collected via questionnaire at baseline, including age, gender, duration of OA symptoms, previous treatments, other musculoskeletal pain, medical history, and medication use. Body mass index was calculated using self-reported height and weight.

Primary and secondary outcomes are collected at six and 12 months from baseline. Primary outcomes include knee pain and physical function. Knee pain was measured using an 11-point numerical rating scale ranging from 0 (no pain) to 10 (worst pain possible) to rate overall average pain in the past week. Physical function was measured using the physical function subscale of the Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index (Bellamy et al., 1988), which includes 17 questions, each scored 0-4, resulting in an overall score ranging from 0 (no dysfunction) to 68 (maximum dysfunction). The validity, reliability, and responsiveness of the WOMAC have been demonstrated (McConnell et al., 2001).

Secondary outcomes included knee pain while walking, self-efficacy, physical activity, kinesiophobia, health-related quality of life, participant-perceived change, satisfaction, health service use/co-interventions, and work productivity. Additional measures include adherence, adverse events, therapeutic alliance, satisfaction with telephone-delivered physiotherapy, and expectation of treatment outcome. These outcomes are all described in more detail in the trial protocol (Hinman et al., 2017b).
Chapter 6 Training physical therapists in person-centred practice for people with osteoarthritis: a qualitative case study


Author contribution for this chapter are the following: study conception and design (RSH, BJL, KLB, CD); data collection (BJL); data analysis (BJL, CD) and interpretation of data (all authors); drafting of the manuscript (BJL); critical revision of the manuscript (all authors). All authors approved the final version of the manuscript.

This study was funded by the National Health and Medical Research Council (Partnership Project #1112133 and Centre of Research Excellence (#1079078)) and the Medibank Better Health Foundation, with in-kind support from MOVE muscle, bone and joint health (formerly Arthritis & Osteoporosis Victoria), HealthChange Australia and the Australian Physiotherapy Association. RSH is supported by Australian Research Council Future Fellowship (FT130100175). BJL is supported by a PhD stipend from the National Health & Medical Research Council Centre of Research Excellence (#1079078). KLB is supported by a National Health & Medical Research Council Fellowship (#1058440).
Chapter 6. Physiotherapists’ experiences training in person-centred practice

Training Physical Therapists in Person-Centered Practice for People With Osteoarthritis: A Qualitative Case Study

BELINDA J. LAWFORD, CLARE DELANY, KIM L. BENNELL, CAROLINE BILLS, JANETTE GALE, AND RANA S. HINMAN

Objective. To explore physical therapists’ experiences with, and the impacts of, a training program in person-centered practice to support exercise adherence in people with knee osteoarthritis.

Methods. This was a qualitative case study using semi-structured interviews, nested within a clinical trial. Eight Australian physical therapists were interviewed before, and after, training in person-centered practice for people with knee osteoarthritis. Training involved a 2-day workshop, skills practice, and audit of 8 consultations with 4 patients (per therapist), and a final single-day workshop for audit feedback and consolidation. Semi-structured interviews were audio-recorded and transcribed verbatim. Data were thematically analyzed.

Results. Three pretraining themes arose regarding usual communication style, definitions of person-centered care, and sharing exercise adherence responsibility. Three themes related to the training experience emerged: learning a new language, challenging conceptions of practice, and putting it into practice. Post-training, 3 themes arose regarding new knowledge deepening understanding of person-centered care, changing beliefs about sharing responsibilities, and changed conceptions of role.

Conclusion. Although physical therapists found training overwhelming initially as they realized the limitations of their current knowledge and clinical practice, they felt more confident and able to provide person-centered care to people with knee osteoarthritis by the end of training. Training in structured person-centered methodology that provides opportunity for skills practice with patients using a restructured consultation framework can change physical therapists’ beliefs about their roles when managing patients with osteoarthritis and positively impact their clinical practice.

INTRODUCTION

Clinical guidelines advocate regular, ongoing exercise as a fundamental component of osteoarthritis (OA) management (1,2). However, people with OA find it hard to change behaviors and adhere to exercise recommendations over the long-term (3), resulting in loss of exercise benefits 6 months after treatment has ceased (2). People with OA face a range of barriers to exercise participation, including, but not limited to, lack of motivation, habits of inactivity, and being prescribed a rigid exercise program that lacks patient input (4). This problem necessitates a person-centered approach to exercise treatment to optimize long-term adherence and clinical outcomes.

Person-centered care is defined as care that is respectful of individual patient needs and preferences (5–7), involving an individualized and holistic approach to patient management (8), as well as shared decision-making, provision of information about the condition and management options, and communication that is focused on patient empowerment (8–10).

Supported by the National Health and Medical Research Council (Partnership Project #1122133), Centre of Research Excellence (#1079078), and the Medibank Better Health Foundation, with in-kind support from MOVE Muscle, Bone and Joint Health, HealthChange Australia, and the Australian Physiotherapy Association. Dr. Lawford’s work was supported by a PhD stipend from the National Health and Medical Research Council Centre of Research Excellence (#1079078). Dr. Bennell’s work was supported by a National Health and Medical Research Council Fellowship (#1059440). Dr. Hinman’s work was supported by an Australian Research Council Future Fellowship (FT130100175).

1Belinda J. Lawford, BMedSci, BPhysio, MHealthSci(Hons), Clare Delany, BPhysio, MMedLaw, BPhysio, PhD, Kim L. Bennell, BAppSci(Physio), PhD, Rana S. Hinman, BPhysio(Hons), PhD: University of Melbourne, Melbourne, Victoria, Australia;
2Caroline Bills, BAppSci(Physio), GradDipManipTher, MPhysio, Janette Gale, BA(PsychHons), MCommerce: HealthChange Australia, Sydney, New South Wales, Australia.

Ms Gale owns HealthChange Australia, which provided the training to the physical therapists.

Address correspondence to Rana S. Hinman, BPhysio (Hons), PhD, Centre for Health Exercise and Sports Medicine, Department of Physiotherapy, School of Health Sciences, University of Melbourne, Parkville, Victoria, 3010 Australia. E-mail: ranash@unimelb.edu.au.

Submitted for publication January 15, 2017; accepted in revised form June 27, 2017.
Significance & Innovations

- Provision of care that is person-centered may improve long-term exercise adherence among people with osteoarthritis, yet health professionals, including physical therapists, are often not trained to provide care in this way.
- A training program in structured person-centered practice can change physical therapists’ beliefs about their role in managing patients with osteoarthritis, increasing their feelings of responsibility to assist patient adherence to exercise and other self-management recommendations.
- To facilitate changes in clinical practice, training programs may wish to consider including an extended period of skills practice with patients.

Person-centered care can help patients change their behavior by taking into account personal preferences and barriers or enablers to change (11). A number of systematic reviews have found that provision of person-centered care has benefits to the consultation process (i.e., clarifying patient concerns and beliefs, communicating treatment options, and empathy) (12), enhancing patient’s ability to self-manage (13), improving health outcomes (14,15), and increasing patient satisfaction with care (13).

Of all allied health professionals in Australia, general practitioners most frequently refer their patients with OA to physical therapists (16), who, due to their training in rehabilitation, are best placed to assist people with OA to increase exercise and physical activity participation. However, physical therapists often fail to consider person-centered practice principles when prescribing exercise for people with OA (17–19), and instead adopt a paternalistic approach toward management (17). Many physical therapists lack the understanding, skills, and confidence to incorporate psychological approaches (including goal-setting, motivational techniques, and communication skills) into routine clinical practice (19,20), and as they do not traditionally receive comprehensive training in this area, they may be reluctant or unwilling to change their behavior to become more person-centered (21). Given that it is ineffective to simply advise clinicians to change their clinical practice (22–24), specific training in person-centered care is necessary (25–27). This fact has been recognized by the European League Against Rheumatism, which has highlighted the need for training to teach health care providers the skills needed to initiate and establish lifestyle changes in people with OA (28).

Professional training and education can facilitate the implementation of person-centered care practices (29). A Cochrane review showed training programs that promote patient-centered care within clinical consultations are effective in transferring patient-centered skills to health care providers (12), yet none of the included studies involved physical therapists. A recent clinical trial (30) showed that physical therapists who underwent a self-determination theory-based communication skills training program were able to provide greater psychological support for patients with chronic low back pain than those who did not receive training. Physical therapists who completed training in cognitive functional therapy (which integrates cognitive, social, and psychological factors to treat back pain) described changes in their communication style and a greater understanding of the role of patient beliefs (31). However, little is known about the experiences of physical therapists who complete these biopsychosocial training programs, and what aspects of training they value most, or least. Therefore, the aim of this study was to explore physical therapists’ experiences with, and the impacts of, a training program in a methodology that operationalizes person-centered practice to support exercise adherence in people with knee OA.

SUBJECTS AND METHODS

Design. A qualitative longitudinal case study, nested within an ongoing randomized controlled trial (RCT) was conducted (32). A qualitative approach was chosen to explore training experiences and impacts. Research design drew from a constructivist paradigm, which assumes that knowledge and understanding are built through experience and interpretation of individuals rather than being objectively measured, irrespective of the person involved (33,34). The Standards for Reporting Qualitative Research checklist ensured complete and transparent reporting (35).

Participants. All 8 physical therapists based in Victoria, Australia, who were employed to deliver the intervention for the RCT, participated in this qualitative study. Selection criteria included a physical therapy qualification, at least 2 years of musculoskeletal professional experience, and current Australian physical therapy registration. All participants provided written informed consent and the Institutional Ethics Committee approved the study.

Training program. Physical therapists completed a training program delivered by HealthChange Australia (http://www.healthchange.com), which provides a health service delivery methodology (HealthChange Methodology) for person-centered care, including promotion of health literacy, shared decision-making, behavior change, and self-management to support adherence to evidence-based recommendations. HealthChange Methodology operationalizes and integrates psychological theories and principles commonly used as the basis for complex behavioral interventions (36–38), drawing on similar techniques to those used in motivational interviewing, solution-focused counseling, and cognitive behavioral therapy. The program combines 3 main processes to facilitate health behavior change: formulating a behavioral goal intention, converting intention into action and maintenance, and person-centered communication processes (39). Specific person-centered practice principles and behavior change techniques involved in HealthChange Methodology are described in Table 1. The methodology also restructures consultation tasks (see Supplementary Figure 1, available on the Arthritis Care & Research web site at http://online library.wiley.com/doi/10.1002/arct.23314/abstract) to align
Table 1. HealthChange methodology person-centered practice principles and essential behavior change techniques

<table>
<thead>
<tr>
<th>Person-centered practice principles</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client-centered, client choice, client control</td>
<td>A practice principle that prompts clinicians to be person-centered by balancing duty of care with patients’ rights to make fully informed, conscious decisions about what actions they will take. Encourages respect for autonomy and choice wherever possible.</td>
</tr>
<tr>
<td>Call it as you see it (with tact)</td>
<td>A practice principle that prompts clinicians to engage in honest and open communication with patients and refrain from engaging in pretense in relation to patients’ readiness to take action. Calls for clinicians to tactfully highlight contradictions in a person’s behavior with regard to readiness.</td>
</tr>
<tr>
<td>Four aspects of goal setting</td>
<td>A practice principle that outlines 4 aspects that need to be considered when setting health and quality of life goals with patients: 1) objective clinical targets; 2) behavioral treatment, lifestyle and referral categories; 3) short-term behavioral personalized health goals; 4) motivational drivers. Structures goal setting processes to be systematic and effective.</td>
</tr>
<tr>
<td>One thing at a time, one step at a time, adding up over time</td>
<td>A practice principle that prompts clinicians to engage patients in goal setting and action planning in a manner that ensures goals and actions are realistic, manageable, and clinically effective over time.</td>
</tr>
<tr>
<td>The RICK principle</td>
<td>A practice principle that prompts clinicians to consider that in order to take action on recommendations, patients need to be Ready, think the actions are Important enough to do, have the Confidence to do them, and have enough knowledge about what they are trying to do and why, so that they are more likely to take and sustain action over time.</td>
</tr>
<tr>
<td>First ask, then offer</td>
<td>A practice principle that prompts clinicians to check patients’ existing knowledge and ideas prior to offering information, education, or suggestions. Used to identify correct understanding, knowledge gaps, and misinformation and allow tailored provision of information.</td>
</tr>
<tr>
<td>Wait ‘til 8</td>
<td>A practice principle that prompts clinicians to provide patients with adequate thinking time (8 seconds) to formulate responses to questions that need consideration.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Essential behavior change techniques</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client first</td>
<td>A technique that provides a formula to construct phrasing to operationalize the “first ask” part of the “First ask, then offer” principle to elicit patient knowledge and ideas prior to offering information.</td>
</tr>
<tr>
<td>Menu of options</td>
<td>A technique that provides a formula to construct phrasing to operationalize the “then offer” part of the “First ask, then offer” principle to offer information and choice in a person-centered way.</td>
</tr>
<tr>
<td>RICK radar</td>
<td>A technique that prompts clinicians to consider both verbal and nonverbal cues regarding patients’ readiness, importance, confidence, and knowledge levels relating to taking recommended actions and to detect ambivalence to taking action.</td>
</tr>
<tr>
<td>Ask RICK</td>
<td>A technique that provides instruction on how to effectively inquire about patients’ levels of readiness, importance, confidence, and knowledge (health literacy) when these are not obvious to the clinician.</td>
</tr>
<tr>
<td>RICK-focused decisional balance</td>
<td>An extended decisional balance technique that incorporates actively assessing, building and reinforcing readiness, importance, confidence, and knowledge (health literacy) into the process of inquiring about the pros and cons of 2 sides of a decision.</td>
</tr>
<tr>
<td>Changing thinking habits</td>
<td>A technique that provides clinicians with a formula to construct phrasing to identify everyday thinking barriers that may impact on patients’ ability to carry out agreed tasks within the agreed time frame.</td>
</tr>
<tr>
<td>Tracking and monitoring</td>
<td>Techniques that enable clinicians and patients to track behaviors and monitor outcomes for the purpose of assessing and reinforcing progress. To be included in action plans.</td>
</tr>
</tbody>
</table>

with patient information and decision-making needs, guiding clinicians to avoid or recognize and address potential patient adherence barriers.

The training program comprised 2 initial training days (HealthChange core training part 1), skills practice and audit over 3 months, followed by 1 final training day (HealthChange core training part 2). All training days were run by a senior facilitator (CB) in a workshop-style format, involving lectures, role-playing exercises, group discussions, and video demonstrations. During the initial training day, physical therapists were provided with a lecture note booklet and a HealthChange miniguide, containing a series
Chapter 6. Physiotherapists’ experiences training in person-centred practice

Table 2. Physical therapist characteristics (n = 8)

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Sex</th>
<th>Work setting</th>
<th>Clinical experience, years*</th>
<th>Previous training in behavior change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susan</td>
<td>Female</td>
<td>Private and public</td>
<td>20</td>
<td>Yes†</td>
</tr>
<tr>
<td>George</td>
<td>Male</td>
<td>Private</td>
<td>4</td>
<td>No</td>
</tr>
<tr>
<td>Peter</td>
<td>Male</td>
<td>Private</td>
<td>15</td>
<td>Yes†</td>
</tr>
<tr>
<td>Jill</td>
<td>Female</td>
<td>Private</td>
<td>7</td>
<td>No</td>
</tr>
<tr>
<td>Meg</td>
<td>Female</td>
<td>Public</td>
<td>28</td>
<td>No</td>
</tr>
<tr>
<td>Alice</td>
<td>Female</td>
<td>Private and public</td>
<td>14</td>
<td>Yes†</td>
</tr>
<tr>
<td>Tom</td>
<td>Male</td>
<td>Private</td>
<td>5</td>
<td>No</td>
</tr>
<tr>
<td>David</td>
<td>Male</td>
<td>Private</td>
<td>17</td>
<td>No</td>
</tr>
</tbody>
</table>

* Mean ± SD 14 ± 8 years.
† Day/weekend courses, no formal assessment.

of cue cards relating to principles and processes taught. The first 2 training days covered 3 key components of HealthChange Methodology: practice principles to guide effective communication and knowledge transfer, techniques to identify and address barriers to behavior change, and a 10-step decision framework to guide consultation decision-making.

Following the first 2 training days, each physical therapist was assigned 4 patients with knee OA to practice the processes taught during training over a 3-month period. Patients were provided with a folder that included information to increase knowledge about the importance of motivation for success with self-management, a personal self-management plan, and exercise instructions. Physical therapists were provided with a structured consultation framework using HealthChange Methodology, embedded within online treatment notes. Each physical therapist conducted 2 consultations over the telephone (2 weeks apart) with each patient. These calls aimed to commence the patient on a structured strengthening and/or physical activity program, and then review progress and modify the program/plan as needed. All calls were audio-recorded and reviewed by the training facilitator, and physical therapists self-audited their own calls against a customized check-list. The final training day reviewed key concepts and discussed audit findings. Physical therapists were

![Figure 1. Conceptual model depicting changes in physical therapists’ confidence in their ability to practice in a person-centered manner across phases of training and beyond.](image-url)
financially compensated for the time invested in the training and self-audit activities, as well as for participating in the semi-structured interviews.

Semi-structured interviews. Interviews were conducted in the weeks prior to the first training day and repeated after the final training day. In accordance with a constructivist paradigm, interview topics were designed to explore physical therapists’ beliefs about their role managing patients with OA, as well as their perceptions about their training experiences including a description of their pre- and post-training beliefs and practices (see Supplementary Table 1, available on the Arthritis Care & Research web site at http://onlinelibrary.wiley.com/doi/10.1002/acr.23314/abstract).

For convenience and to facilitate participation in the research, interviews were conducted over the telephone. Interviews were conducted by the same investigator (BJL), a graduate research student trained in qualitative methodologies, who is not a clinician, and who also attended the training program with the physical therapists, but was otherwise unknown to them. Interviews were audio-recorded and transcribed verbatim, and pseudonyms assigned to each physical therapist for confidentiality purposes. Each interview lasted approximately 30 minutes. All data were de-identified and stored in digital format on a password-protected university server.

Data analysis. Analysis was based on a thematic approach (40). Interview transcripts were read through by an investigator (BJL) soon after transcription, and then were re-read and coded by placing a short description next to the text to identify topics within the data. Codes were organized into categories with similar or related concepts. To confirm emerging ideas, categories were checked over and revised in collaboration with one investigator (BJL) by a qualitative expert who had no contact with participants (CD), who also independently coded a sample of transcripts. Categories were then refined and developed into themes and subthemes, which were subsequently reviewed and discussed with all members of the research team (41). To ensure credibility and confirmability of the data, RSH read all transcripts prior to discussion of the themes/subthemes that were developed by BJL and CD. To ensure transferability of our findings, themes and subthemes were presented with exemplary quotes from the interview transcripts (42).

RESULTS

All physical therapists completed pretraining and post-training interviews. The sample comprised an equal number of men and women (mean ± SD age 35 ± 8 years), who mostly worked in private health settings (Table 2). Themes and subthemes were developed from the data according to 3 phases: pretraining, the training experience, and post-training. A clear process of change in physical therapists’ confidence in their ability to practice in a person-centered manner was evident across training phases (Figure 1). Before training, therapists were able to define person-centered care and believed that their practice was person-centered. After the first 2 training days, they appeared to recognize some limitations of their current knowledge and skills in this area, and this recognition contributed to a drop in confidence. After completing the practice phase with patients, as well as the final training day, confidence increased, and all had a greater understanding of how to embed person-centered practices into their clinical practice and reported that this understanding had impacted and changed their usual clinical practice.

Pretraining. Theme 1: usual communication style. Physical therapists spoke of the importance of delving into patient’s lives in order to understand their expectations of treatment (Table 3). However, this interaction was sometimes in the context of the therapist telling the patient what was best for them.

Theme 2: defining person-centered care. Physical therapists defined person-centered care as shared decision-making with the patient and their family members and/or care-givers. They described a responsibility to recognize each patient as an individual, and the importance of promoting patient independence.

Theme 3: sharing responsibility. Therapists believed that exercise adherence was ultimately the patient’s responsibility. However, they also acknowledged their role in educating the patient about the importance of continuing an exercise program. Some also believed that, as part of prescribing exercises and promoting adherence, they had a responsibility to understand the patient’s situation and lifestyle.

The training experience. Theme 1: learning a new language. Physical therapists reflected on feeling overwhelmed and anxious about the volume of new terminology and new ideas presented during the first 2 training days (Table 4). Some struggled to understand how the principles and techniques could be applied during a standard consultation.

Theme 2: challenging conceptions of practice. Therapists felt that the material presented during the first 2 training days challenged their conceptions of clinical practice, pushing them out of their comfort zone and constraining their usual communication style. George reflected that without training, he would have dictated treatment to the patient. Some felt uncomfortable with the idea of using some of the more specific training techniques, such as discussing personal motivators for engaging in exercise and/or evaluating readiness to change behavior. Some felt that some principles and techniques taught during training may not always be relevant for all patients, for example patients who self-refer to private practice and are typically self-motivated.

Theme 3: putting it into practice. After having applied the methodology with real patients, therapists believed the restructured consultation framework improved their communication with the patient. Therapists experienced difficulty with time management, believing that they did not have enough time to use all of the management strategies and techniques effectively. However, therapists believed that the opportunity to practice using the principles, techniques and restructured consultation framework was a valuable learning experience. The final training day helped consolidate knowledge and understanding of the methodology, and therapists felt confident and prepared.
<table>
<thead>
<tr>
<th>Theme/subtheme</th>
<th>Exemplary quote</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usual communication style</strong>&lt;br&gt;1. Delving into patient's lives</td>
<td>George: &quot;I think it’s very important to be able to delve into patient’s lives. If they’re interested and they’re giving you that back, but I think it’s important to talk about other things than just physio and their knee, because I think, you know, learn about what they do for a job, do they have kids, what do their kids do and, I suppose, just build conversation and relationships that way, because then I think you build trust with the patient.”&lt;br&gt;Alice: “A lot of the time it’s listening, and also finding out what their goals are... are you trying to get back to work, are you trying to get back to sport... trying to make it all relevant to them.”&lt;br&gt;David: “I think trying to develop a bit of trust, and I think that comes about by listening to the person, and giving them time and opportunity to talk about what their problems are and how they’re feeling.”</td>
</tr>
<tr>
<td>2. Understanding patient expectations</td>
<td>George: “I suppose from a communication style is to be... to be really positive as well, I think, but also be quite firm in the way I say things, and almost give them ‘well these are my expectations because you need to do this to get better,’ so you should very much still be driving the bus for them, and making sure that they are on track, but at the same time being polite, friendly, being very upbeat.”&lt;br&gt;Jill: “I think one of the most important factors is making sure they feel involved in the process, involved in the decision-making as well, and again, as I mentioned before, that understanding of why we want them to do certain things I think is so important, not just handing over a sheet of paper saying ‘do these,’ it’s an understanding and that communication ‘OK, this is what we’re trying to achieve, what is your goals?’ Setting goals with people and just how we’re going to get there, and this is why you need to be doing certain things.”&lt;br&gt;Tom: “The other key thing is patient expectations, that’s really the key thing. If you can work out what they want and you can verbalize ‘this is what I think you want’ and get it right, I think that goes a long way to having them on track and develop that rapport and they know that you’re actually listening to them and thinking about what they want.”&lt;br&gt;David: “I’ll typically just get the patient to talk about what they’re coming for, what they’re goals are, and just get them talking openly about what their problems are, and then also try and link that in with how their condition or impairment is affecting their functions, their lifestyle, and based on that then try and, yeah, give them the right treatment program and plan for them.”</td>
</tr>
<tr>
<td><strong>Defining person-centered care</strong>&lt;br&gt;1. Shared decision-making</td>
<td>Jill: “Keeping them involved in the decision-making process and explaining why we want them to do certain things, making sure that the treatment that we’re providing does fit into their lifestyle.”&lt;br&gt;Susan: “I guess with some people if they’re more functionally limited and they’ve got carers and family members then it’s also getting input from those people as well.”&lt;br&gt;Meg: “So it’s where we’re working with patients and their families but we’re actively encouraging their participation in sort of shared decision-making.”</td>
</tr>
<tr>
<td>2. Recognizing the patient as an individual</td>
<td>Jill: “I guess my interpretation of patient-centered care is treating each client as an individual, even though they may have quite a common problem. It is individual to them, and we need to be respectful of what they’re aiming to get out of treatment.”&lt;br&gt;Meg: “So giving them lots of options and talking to them about these sorts of things will be really useful, but what sorts of things do you think will best fit in with your lifestyle, what sorts of things do you know you’ll be most likely to continue with.”&lt;br&gt;Alice: “I guess it’s providing care that’s specific to the person, so making sure you’re not kind of giving a generalist program, and tailoring it to the individual. And modifying it accordingly if they have exacerbations or difficulties, you change your method accordingly.”</td>
</tr>
<tr>
<td>3. Promoting independence</td>
<td>David: “So person-centered care is more about making that patient independent and have the skills in place where they can manage and cope with their condition or their problem. It’s very much giving them that awareness that they need to be self-managing those problems.”&lt;br&gt;Peter: “Person-centered care, I guess, is the ability of a client to actually have ongoing active involvement in their own well-being and therefore progression of their pathology for the better. Being reliant on self motivation and exercise compliance kind of stuff.”</td>
</tr>
</tbody>
</table>
### Table 3. (Cont’d)

<table>
<thead>
<tr>
<th>Theme/subtheme</th>
<th>Exemplary quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharing responsibility</td>
<td>Susan: “Ultimately even if you put in the program that you’ve agreed on with the patient that seems to fit into their life best and that you’ve put in some clear sort of goals, and you’ve motivated them and you’re trying to get them to have regular appointments or regular contact to help support them, ultimately it’s the patient’s responsibility to do it.” Jill: “Ultimately it’s the patient. I think they’ve really got to want to do it, they’ve really got to be looking after themselves... we can only do so much as a therapist in helping people along the way.”</td>
</tr>
<tr>
<td>2. Therapist responsibility to educate the patient</td>
<td>Meg: “You can’t expect them to be responsible for it if they don’t understand how it can help.” Susan: “I’d like to think that ultimately the physio’s got a really important role to help educate the patient to understand why it’s important [to adhere to exercise].” David: “It’s a team effort, but it has to work on both sides, and I think certainly if there’s a therapist prescribing a program, it needs to be aware that they’ve set up those exercises for a particular purpose and the reason, and we need to say that to the patient, and explain to them the importance of why we’ve chosen those exercises for them.”</td>
</tr>
<tr>
<td>3. Therapist responsibility to understand the patient situation</td>
<td>Tom: “With the number of exercises or the number of times they do it a week and that sort of thing, you want to make sure you have a bit of a discussion with them on what’s going to be reasonable and also what’s going to fit into their schedule at the same time.” Peter: “I think certainly within the [RCT] that [having a physiotherapist touch base with a patient] can certainly be really effective and generate again that client feeling that this physiotherapist actually cares about their outcome and long term. Therefore their compliance to the exercise program I think will be better.”</td>
</tr>
</tbody>
</table>

* RCT = randomized controlled trial.

**Post-training. Theme 1: defining person-centered care.** After training, therapists did not change their description of person-centered care, but instead acknowledged a deeper and more complex understanding of it (Table 5). Importantly, therapists described an increased ability to integrate person-centered care within their patient consultations.

**Theme 2: sharing responsibilities.** After training, therapists believed that they had a bigger role to play in supporting their patients to adhere to prescribed exercise and physical activity recommendations. This belief was particularly apparent in relation to creating strategies or plans to help patients move forward with their exercise program and assisting them to make a decision to take action and commence an exercise program. Therapists noted that they should be less prescriptive with patients in clinical practice.

**Theme 3: changed conceptions of role.** There was evidence of both acceptance, and resistance, to incorporating person-centered care methodology into usual clinical practices after training. Therapists believed that the training had positively impacted their communication style with patients in the clinic, with many spending more time discussing personal barriers and facilitators to exercise. Some acknowledged that it was difficult to change their practice habits, and George did not believe that a person-centered approach suited his personality or the way he liked to interact with patients, and did not intend to incorporate it into his practice.

**DISCUSSION**

Our study explored physical therapists’ experiences of training in person-centered practice and how these experiences impact on their beliefs about their role managing patients with chronic disease. Other qualitative studies have explored the impact of cognitive behavioral therapy training programs on physical therapists’ perceptions of their clinical roles and behaviors. Nielsen et al (43) trained physical therapists to deliver cognitive behavioral therapy for people with OA, involving a 3–4 day workshop and weekly group tutorials with a psychologist for 3–6 months, followed by biweekly tutorials for the next 18 months while delivering the intervention as part of an RCT. Another study trained physical therapists to deliver cognitive functional therapy, a multidimensional intervention that explores and manages cognitive, psychological, and social factors in the management of chronic low-back pain (31), where therapists on average completed 9 workshops (timeframes not specified) and received supervised practice delivering the program for at least 4 sessions of clinical practice. Both studies reported similar findings to ours, where therapists reported an increased understanding of the role of patient beliefs and appreciation for the therapeutic alliance (31), and were able to encourage their patients to take a more active role in their rehabilitation (43), post-training.

Some design elements of our training program were similar to previous physical therapist training studies. The most common element is the use of workshops to deliver training (30,31,43), although the content and theoretical underpinnings varied, as well as the duration of the workshops. The most recent Cochrane review evaluating the effectiveness of training health care professionals in person-centered care concluded that short-term training programs (~10 hours duration) were equally as effective as longer training programs, in terms of having positive effects on consultation processes.
<table>
<thead>
<tr>
<th>Theme/subtheme</th>
<th>Exemplary quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning a new language</td>
<td><strong>1. New ideas</strong></td>
</tr>
<tr>
<td></td>
<td>Susan: “It was just how it all fitted together that was, I guess, like learning a different language. I guess initially I found the training a bit bamboozling. There was lots of new terminology and stuff.”</td>
</tr>
<tr>
<td></td>
<td>Alice: “There was a lot of information. And I found it really interesting but I had to kind of process all the information and digest it and put it into practice for it to really make sense.”</td>
</tr>
<tr>
<td></td>
<td>Tom: “Conception, I think, was particularly difficult. How to implement it, as in the exact wording and what situation calls for exactly what, comes with obviously just experience and trying it out. As a concept, each of the things were fairly understandable.”</td>
</tr>
<tr>
<td></td>
<td><strong>2. New ideas</strong></td>
</tr>
<tr>
<td></td>
<td>Susan: “I guess the training had much more structure and more levels to it than perhaps I thought. I think the training and the methodology is quite comprehensive and there’s quite a lot to it.”</td>
</tr>
<tr>
<td></td>
<td>George: “I just remember it being really informative, my head hurting in the end of the day and, you know, sometimes whether it’s too informative… I don’t know if it’s too informative and too much content to digest, sometimes.”</td>
</tr>
<tr>
<td></td>
<td>Alice: “There was a lot, a lot of content and I don’t know, I kind of felt like we jumped around a bit. So I kind of went away going ‘wow a whole lot of information, I’m not really sure how to process it.’”</td>
</tr>
<tr>
<td></td>
<td><strong>3. Feeling overwhelmed and anxious</strong></td>
</tr>
<tr>
<td></td>
<td>Meg: “I found [the first 2 training days] really interesting, very engaging, a little overwhelming just because it was a lot of, in a way, a different way of doing things, I guess.”</td>
</tr>
<tr>
<td></td>
<td>Jill: “Very overwhelming would be my description of it. I went home from that first day of training very confused and a bit disheartened to be honest because I’ve never felt so confused when trying to learn a new content of any kind.”</td>
</tr>
<tr>
<td></td>
<td>David: “I found it was pretty overwhelming to start with, but having the 2 days of initial training was definitely beneficial and definitely consolidated some of the ideas and topics that were brought up on the previous day.”</td>
</tr>
<tr>
<td>Challenging conceptions of practice</td>
<td><strong>1. Out of comfort zone</strong></td>
</tr>
<tr>
<td></td>
<td>Meg: “It’s just a very different way of conducting, I guess you could call it, a treatment as such from what we’ve been trained to do. So that was in itself a little bit overwhelming, but you can cope with it but just you had to get your head around doing things quite differently.”</td>
</tr>
<tr>
<td></td>
<td>Jill: “I was panicking a little bit… I probably spent an extra 2 to 3 hours just sitting there with all the resources again just trying to get my head around it before that first call [with a pilot patient].”</td>
</tr>
<tr>
<td></td>
<td>George: “Say I hadn’t done the training and you just said, ‘Okay, off you go, call someone and teach them exercises over the phone,’ I definitely would have gone about it differently. Truthfully, I would be sort of dictating to the patient what they needed to do rather than asking if they would like to do it and the whole of it.”</td>
</tr>
<tr>
<td></td>
<td><strong>2. Constraining usual communication style</strong></td>
</tr>
<tr>
<td></td>
<td>Susan: “I felt like it was sort of maybe cramping my normal communication style as a physio where I feel quite confident that I can interact with the patient.”</td>
</tr>
<tr>
<td></td>
<td>Meg: “I think it was more a matter of feeling that I was going to cover up on all the different steps and trying to get that in a smooth fashion rather than sounding really clunky and a conscious sort of interacting in a different way.”</td>
</tr>
<tr>
<td></td>
<td>Alice: “So yeah, just getting my head around the structure of the conversation, it’s a bit different how I would normally talk to a patient.”</td>
</tr>
<tr>
<td></td>
<td><strong>3. Feeling uncomfortable using some of the techniques</strong></td>
</tr>
<tr>
<td></td>
<td>Susan: “I remember talking particularly about 2 things that made me feel slightly uncomfortable, but I set my professional boundaries with things that I wouldn’t usually do. One was talking about people’s motivators in a more personal way…”</td>
</tr>
<tr>
<td></td>
<td>Jill: “I think certainly when we’re talking about that kind of decisional balance type technique I’m not sure how comfortable I’d feel using that on someone I may have met for the first time face to face, I’m not sure.”</td>
</tr>
<tr>
<td></td>
<td>George: “I normally really keep my patients in check and accountable for their actions and the patient hasn’t done their exercise, it’s like, ‘Well, why?’ Now it’s like, oh, well, we’re giving these patients so much room to move. It would be interesting to see if we lose compliance by being too lenient. I’m not too sure.”</td>
</tr>
</tbody>
</table>
### Table 4. (Cont’d)

<table>
<thead>
<tr>
<th>Theme/subtheme</th>
<th>Exemplary quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Deciding scope and limits of new methodology</td>
<td>Peter: “The decisional balancing” and all that sort of stuff I think is a little bit tricky in my work setting to a certain degree. And I think it’s probably more that I don’t get clients that it’s significantly relevant for.”</td>
</tr>
<tr>
<td></td>
<td>George: “Sometimes I think whether it’s a little bit too recipe focused, I’m not too sure. I think that… I think at the end of the day she’s [the training facilitator] sort of the guru and you’ve got to trust her and go with what she says and, absolutely, that’s what I’m going to do based on what she’s saying, but once again I was a little bit surprised because I think that there’s probably multiple recipes you could deliver to get the same outcome.”</td>
</tr>
<tr>
<td>Putting it into practice</td>
<td>Susan: “I think there’s really good structure in the methodology, particularly around communication. I guess because the methodology is so detailed, I don’t have those concerns anymore about dealing with different types of communicators [in the RCT]. I feel like the methodology and the training that we’ve done has given me better skills to deal with lots of different types of communicators. I feel definitely more confident about that.”</td>
</tr>
<tr>
<td>1. Improved communication</td>
<td>Alice: “I thought [the training] was really good from that point of view, as far as improving the verbal communication, which obviously when it’s over the phone, that’s the key bit.”</td>
</tr>
<tr>
<td></td>
<td>Tom: “I thought [the methodology] was nice in the sense that it had a lot of concepts that I actually probably didn’t practice, but this put names to it and put a bit more of a system behind it. That was probably my biggest take from it… that it’s a nice, more formatted way of doing things that I was potentially already doing, but that’s still good to work on.”</td>
</tr>
<tr>
<td>2. Time pressures</td>
<td>Susan: “You often have a sense of being under time pressure, and I understand that the training is more about choosing the things that are going to be of most value to the patient that you work on together, rather than trying to do all the things that you think that you need to do over physio, and some of that is very difficult to change your mind set about that.”</td>
</tr>
<tr>
<td></td>
<td>Peter: “I think the pilot clients were really difficult to fit in, getting across everything that you wanted to get across in just 2 phone calls and set them up for a long-term 6-month plan. I felt that was just far too much to fit into the timesframes… whereas when you know you’ve got more phone calls that are perhaps over a longer period of time with that more difficult client, I would be confident of applying those methodologies.”</td>
</tr>
<tr>
<td></td>
<td>George: “I think time was a big issue… I’m just like here I am standing here going this is all taking too long and then I’m just like [based on feedback from the training facilitator] you’re actually just going to make it longer. How much asking do you need to do, especially if you’ve got another patient coming in 2 or 3 minutes and you’ve got to get wound up? I’m just thinking maybe it would work more in the public [practice setting]. It definitely wouldn’t work in the private practice that I’m at unless, I mean, we have 20 minute appointments, all goes pretty quick. Maybe if I had half an hour, an hour, where I could start to develop more action plans of patients and get their input.”</td>
</tr>
<tr>
<td>3. Value of practice with pilot patients</td>
<td>Peter: “I think until you go and implement it, it’s sort of quite idealistic and a little bit tricky to apply in the real world to a certain degree. So the thought process on how it flows in regards to delivering an actual interaction with a client was certainly tricky to visualize that.”</td>
</tr>
<tr>
<td></td>
<td>Jill: “I noticed from that first [pilot] participants to the last [pilot] participants I was a lot smoother, I could flow on from the conversation, get the information I want… so it was definitely worthwhile doing those practice clients.”</td>
</tr>
<tr>
<td></td>
<td>Meg: “[The pilot patients] have been, well, they continue to be useful, and I think it was really good to have that chance to kind of practice the methodology and try and put it into practice and then be able to have some time to self-reflect on it as well.”</td>
</tr>
<tr>
<td></td>
<td>David: “I think to work through how you can deliver the exercises to the patients and get them on-board and getting them compliant and trying to visualize what they’re going through and quizzing them as they’re going through the program, so that was really useful.”</td>
</tr>
<tr>
<td>4. Value of final training day</td>
<td>Susan: “I thought [the final training day] was good. I think it was really necessary… I felt I really needed that last training to understand that they were a bit better.”</td>
</tr>
<tr>
<td></td>
<td>Jill: “The way it was set out to have that extra day of training that couple of months later was vital. I thought that that was the key component that made me a lot more comfortable with being able to do what the study is wanting me to be able to do. And I think without that third day I’d be not as capable as I should be.”</td>
</tr>
<tr>
<td></td>
<td>David: “I think without those training days it’d be a nightmare, it’d be really difficult to work out what the expectations are and what we have to try and cover… without the 3 days of training I don’t think we would have felt equipped to do that.”</td>
</tr>
</tbody>
</table>

(continued)
Chapter 6. Physiotherapists’ experiences training in person-centred practice

and levels of empathy (12). Our training program involved approximately 24 hours of workshop training, in addition to practice consultations with 4 patients over 3 months. This design reflects the breadth of content of HealthChange Australia training. Longer duration of training is needed to adequately teach therapists to restructure consultations, in addition to behavior change techniques and person-centered practice principles, and to allow adequate time for feedback, self-reflection, and practical application of skills. Similar to our study, 2 previous training programs (30,43) involved expert audit of patient consultations, but in contrast to ours did not involve self-audit of skills.

In pretraining, therapists described person-centered care as shared decision-making, recognizing the patient as an individual and promoting independence, consistent with some elements of person-centered care defined in the literature (44). However, person-centered care is broader than this and spans 8 different dimensions, including respect for preferences and values; emotional support; physical comfort; information, communication, and education; continuity and transition; coordination of care; involvement of family and friends; and access to care (45). After the first 2 training days, therapists felt overwhelmed as they realized the limitations of their current knowledge and skills. They were anxious about applying a restructured consultation framework that required them to deviate from their usual communication and consultation style. This manifested as a loss of confidence from pretraining. Once provided the opportunity to practice with real patients, therapists then gained confidence over time. Post-training, therapists believed they had a deeper knowledge about how to provide care that was person-centered.

From a pedagogical perspective, these changes in confidence reflect the stages of learning proposed by the educational theorist Vygotsky (46). Therapists’ descriptions of how they appreciated opportunities to practice and consolidate learning after initially feeling overwhelmed illustrates the educational significance of scaffolding professional development to enable extension of skills within a supported zone of skills development (46). The stages of learning highlighted in our study also align with other educational approaches, including learning through simulation, where learners acquire skills through experience in realistic situations of environments (47), and models of skill acquisition, where learners are supported through experience, feedback, and deliberate practice (48). The experiences of therapists in our study suggest that facilitation and/or encouragement of deliberate practice of skills with real patients is an important component of training that influences successful uptake and implementation of the new knowledge provided.

Although our study was specifically nested within an RCT to improve outcomes for people with knee OA, our findings are generalizable to a variety of patient populations. HealthChange Methodology is designed for people with health conditions who need support to adhere to treatment and lifestyle recommendations. Thus, this training program has broad relevance for physical therapy practice in musculoskeletal, neurologic, and cardiorespiratory conditions, and in children and adults alike. Most physical therapists in our study worked in private practice musculoskeletal settings, and some felt uncertain whether all aspects of the methodology would be applicable to all patients that they usually see. Some therapists believed that principles/techniques focused on helping patients make a decision to take action (e.g., commence an exercise program) may not be as relevant in private practice settings where many patients are assumed to have already made that decision by self-referral for therapy in the first place. In addition, some believed that they would not have enough time to include all aspects of the methodology, in addition to their usual consultation tasks, in the typical time allowed for patient consultations in the private practice setting.

Physical therapists in our study believed that the training covered new concepts that had not previously been taught in their undergraduate training, which probably contributed to their feelings of being overwhelmed and out of their comfort zone initially. Given that 3 of our 8 physical therapists graduated in the previous 7 years, our findings are probably relevant to physical therapists graduating from contemporary university courses. Therapists commented on how difficult it was to change their established clinical behaviors, and how easy it was to fall back into old behaviors when in their familiar clinical practice environment. This difficulty suggests that specific training in person-centered practice should ideally be incorporated into physical therapy entry-level qualifications, rather than after graduation, when clinical practice habits have formed. This is particularly important given the anticipated changes in the role and scope of private physical therapy practice in
### Table 5. Post-training themes, subthemes, and exemplary quotes

<table>
<thead>
<tr>
<th>Theme/subtheme</th>
<th>Exemplary quote</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Defining person-centered care</strong></td>
<td></td>
</tr>
</tbody>
</table>
| 1. Deeper understanding | Jill: “I think I had not changed but my knowledge probably expanded, I understood the meaning of it in a more complex way. So I kind of understood how treatment should be patient-centered, but now I understand how you actually do that.”  
Alice: “I think [my understanding of person-centered care] has improved. I probably thought I was doing person-centered care but realized that perhaps I wasn’t. It was still kind of me pushing my own agenda, and I’m just trying to learn not to do that as much, not to be so prescriptive, which is a challenge.”  
David: “I think perhaps [my understanding of person-centered care has] became a little bit clearer I’d say. I feel like I’ve got the practical skills now to make what I do more patient-centered definitely.” |
| **Sharing responsibilities** | |
| 1. Bigger role in supporting adherence | David: “I guess the training highlighted that to me, that adherence comes down to both parties, but it’s also up to us as professionals to identify what might be holding the patient back and then trying to create strategies or plans for them to move forward with their program.”  
Meg: “I’d say that my responsibility is probably a little bit higher in terms of making sure that I assist the person as much as possible…not just with giving them the information but trying to assist them with getting to the point where they feel ready to utilize that information. Before the training it probably would have been a little bit more about, okay, you know, I’m the physio, I’m giving you all this information, what you do with it is your responsibility. But now I think it’s a bit more my responsibility also to get them to be ‘below the line’.<<”  
Susan: “I feel like after doing the training I understand that the physio can have a much bigger role to play [in helping exercise adherence].”  
Jill: “I learnt how careful you’ve got to be with the way you say things. One or 2 words changed in a sentence can be portrayed very differently to someone else. I think that’s one thing that I really have to take a step back and think a little bit more about the way I was saying things to try and get people on board [to exercise]. I think the other thing is just the fact of how much we just get used to telling people do this, do this, here’s your exercises, see you later, come back…so it certainly made me be a bit more aware of what the patient wants rather than what I want as a therapist.” |
| **Changed conceptions of role** | |
| 1. New clinical practices: acceptance | Jill: “[The training was] extremely useful for the study, extremely useful for my general life, extremely useful for clients in the clinics. Yeah, and I found it very worthwhile doing. A part of me wonders why I wasn’t taught some of this earlier in my career.”  
Meg: “It’s just that it’s been a really positive experience thus far. I’ve got a lot out of it and not just for the study but…it’s also something that I’ve been interested in looking into for a while, so I’m hoping to continue incorporating it in my other work as well.”  
Alice: “Yes [my practice] has [changed]. Especially regarding exercise prescription, that’s changed a lot and how I talk to them about exercises and I guess making it more person-centered for my own patients.”  
David: “Yeah, definitely [my practice has changed] and I’m wanting to roll out and have more of an impact down the track too. It’s been very refreshing and nice to have this method apply to my thinking and my practice for sure.” |
| 2. New clinical practices: resistance | George: “I think there’s potentially other ways to go about it that probably suit my personality better and then that could actually get a better result… I suppose it’s just a lot of trust to go, yeah, [the HealthChange Methodology] way is going to be the right way, even though I probably want to conduct an interview with this or, yes, I do want to sort of dictate a little bit to my patient. I would say no [my clinical behavior hasn’t changed]. I’m just definitely not as patient-centered.”  
Susan: “Part of it’s about time, so the trade-off is about ticking the boxes of the stuff that you want to do for the patient because it’s your natural way of thinking, that you’re doing a good job versus also trying to add something in that you think has got value from the training, and the reality is that they’re not all going to fit in the same amount of space. I think it takes a much deeper, it’s going to take more time and more depth of really thinking about how to change my practice, because it’s hard to go against so many years of doing things a certain way.”  
Tom: “Certainly trying to [change my practice]. It’s definitely hard to change your habits. Once you’re in a familiar environment, you do tend to fall back into old behaviors, but certainly keen to have an influence.” |

* HealthChange Methodology phrase referring to a patient who has made a decision to take action on a behavior.
Australia expected in coming years (49). An aging population is expected to drive greater demand for chronic and complex disease, not only for OA but also diabetes mellitus, heart disease, obesity, osteoporosis, and mental health. In addition, a greater focus on wellness will drive demand for health coaching services that focus on personal goal setting and self-management.

Our findings have a number of important implications for the design of person-centred care training programs. The physiotherapists felt overwhelmed by the first 2 training days, experiencing difficulties with the volume of content being delivered, as well as the new terminology and/or ideas presented. This experience suggests that training programs may benefit by reducing the amount of new information, at least initially, or by extending the number of initial training days to allow more time to review concepts and minimize feelings of being overwhelmed. Our therapists were completing the training in preparation for an RCT and were invested in learning the methodology, thus their feelings and experiences may be more positive than other therapists less motivated to persist with training. A key finding was that therapists highly valued the 3-month practice phase, as well as the followup training day that took place after the practice phase, both of which are advocated for training of health care professionals in health behavior change methods (50). Future training programs should consider including these elements to further allow skill consolidation.

Strengths of our study include evaluating a training program that is accessible to all Australian health care organizations and clinicians outside the research setting, the use of qualitative methods to gain a deeper understanding of training experiences and changes in beliefs, as well as our longitudinal design, incorporating interviews before and after training. Our study also has some limitations. Our small sample comprised therapists who applied to deliver care for an RCT, were mandated to undergo training, and were reimbursed for their time. Our findings may not be generalizable to the broader population of physical therapists, who may be unwilling to invest time in, and/or pay for, professional development in person-centered practice. Only 1 researcher (BJL) coded and analyzed all transcripts, and therefore data analysis may have been influenced by her own attitudes or perspectives. In an attempt to overcome this bias, a sample of transcripts was independently coded by a researcher who had no contact with the physical therapists. In addition, the fact that BJL was not a physical therapist, or any kind of health professional, also minimized the chances of any personal bias being introduced. Parts of our interview guide were directive, and this fact was reflected in some of the subthemes that were developed. We interviewed physical therapists immediately after training was complete, and whether benefits of training are sustained beyond that time is not clear. Future studies should involve long-term qualitative explorations of changes in beliefs to ascertain whether positive impacts on clinical practice behavior can be sustained, and also investigate training impacts on patient outcomes. We plan to quantitatively evaluate how well our physical therapists implemented person-centered practice principles and behavior change techniques into patient consultations after the 2-day training workshop, based on an audit of the telephone consultations.

REFERENCES

17. Holden MA, Nicholls EE, Young J, Hay EM, Foster NE. UK-based physical therapists’ attitudes and beliefs regarding


Chapter 7 Fidelity of physiotherapists to person-centred practice principles and behaviour change techniques after training: lessons from the Telecare randomised controlled trial

This manuscript is currently under review at Trials, Lawford BJ, Bennell KL, Kasza J, Campbell PK, Gale J, Bills C, Hinman RS. Fidelity of physiotherapists to person-centred practice principles and behaviour change techniques after training: lessons from the Telecare randomised controlled trial. Submitted December 2017.

Author contribution for this chapter are the following: BJL and RSH contributed to conception and design, analysis and interpretation of data, and drafting of the manuscript. JK contributed to analysis and interpretation of data and drafting of the manuscript. KLB contributed to conception and design, and revising the manuscript for intellectual content. PKC recruited physical therapists and patients, and contributed to data collection and interpretation. CB trained the physical therapists, audited telephone calls, and contributed to collection, design and interpretation. JG contributed to conception, design and interpretation and developed HealthChange® Methodology that underpins the training program. All authors read and approved the final manuscript. RSH, KLB and JG obtained the funding for this study.

This study was funded by the National Health and Medical Research Council (Partnership Project #1112133 and Centre of Research Excellence (#1079078)) and the Medibank Better Health Foundation, with in-kind support from MOVE muscle, bone and joint.
health (formerly Arthritis & Osteoporosis Victoria), HealthChange Australia and the Australian Physiotherapy Association. RSH is supported by Australian Research Council Future Fellowship (FT130100175). BJL is supported by a PhD stipend from the National Health & Medical Research Council Centre of Research Excellence (#1079078). KLB is supported by a National Health & Medical Research Council Fellowship (#1058440).
Fidelity of physiotherapists to person-centred practice principles and behaviour change techniques after training: lessons from the Telecare randomised controlled trial

Belinda J Lawford, Kim L Bennell, Jessica Kasza, Penny K Campbell, Janette Gale, Caroline Bills, Rana S Hinman

Abstract

Background. Intervention fidelity is important for interpreting and implementing clinical trial findings, but is infrequently evaluated and reported by researchers. This study aimed to evaluate the fidelity of physiotherapists to a person-centred practice and behaviour change methodology immediately following training for the Telecare clinical trial.

Methods. All eight Telecare trial physiotherapists completed a two-day workshop in person-centred practice and behaviour change support over the telephone for people with knee osteoarthritis. Physiotherapists conducted two telephone consultations with four patients with knee osteoarthritis (per therapist) which were audio-recorded. Fidelity was assessed by both the training facilitator (who audited all consultations) and the physiotherapists (who self-audited 50% of their own consultations). The audit tool appraised: i) 10 person-centred practice principles rated on a numerical rating scale of 0 (need to work on this) to 10 (doing really well) and; ii) seven behaviour change techniques rated with an ordinal scale (using this technique effectively; need to improve skill level or; need to learn how to apply this technique). Data were analysed by calculating means and standard deviations of scores, and linear mixed-effects models were used to determine differences in physiotherapist and training facilitator ratings.

Results. For person-centred principles, scores varied within, and between, physiotherapists. Physiotherapists scored themselves significantly lower than the training
facilitator for three of 10 principles. For behaviour change techniques, the training facilitator believed physiotherapists were using three of seven techniques effectively during most consultations and needed to improve skill levels with most other techniques. Again, physiotherapists tended to rate their skills their less favourably than the training facilitator.

Conclusions. Physiotherapists performed moderately well when implementing person-centred practice principles and behaviour change techniques immediately after training, but with room for improvement from further practice and/or training prior to trial commencement. Physiotherapists’ self-ratings of performance generally agreed with expert ratings, however they underestimated their ability to implement some principles and techniques. Our findings suggest that researchers should consider incorporating “refresher” training, after a period of practice, prior to trial commencement to maximise intervention fidelity.
7.1 Introduction

Exercise is advocated for management of knee osteoarthritis (OA) [1-4], yet uptake is inadequate and long-term adherence is often poor [5-8]. People with OA face a range of barriers to exercise participation including, but not limited to, lack of time, low motivation, transport difficulties, and limited services in smaller cities or rural areas [9-11]. Telerehabilitation is one way in which services can be more accessible to people with OA, allowing them to consult from their own home or workplace. We are currently conducting a randomised controlled trial (RCT), the ‘Telecare’ trial [12], which will determine the effectiveness of incorporating exercise advice and behaviour change support by physiotherapists into an existing Australian nurse-led national musculoskeletal telephone service for adults with knee OA.

An important part of the Telecare intervention is the provision of person-centred care to support behaviour change. Person-centred care is broadly defined as care that is respectful of individual patient needs and preferences [13-15], and is recognised as a crucial component of healthcare [16, 17]. Although healthcare professionals acknowledge the importance of providing care that is person-centred, and often believe that they are doing so [18], many remain focused on the physical or biological elements of the disease/condition, without considering the psychosocial aspects [18-20]. In addition, many physiotherapists do not communicate using person-centred principles [21, 22], and often adopt paternalistic approaches to exercise prescription [23]. Research suggests that physiotherapists may not possess the knowledge, skills, or confidence required to use person-centred practices during clinical consultations [24-27]. As such, physiotherapists in the Telecare RCT were required to complete professional training in person-centred practice and behaviour change techniques prior to the start of the trial.
Intervention fidelity is the extent to which an intervention is delivered as it is intended [28]. Reporting of intervention fidelity in RCTs is crucial for clinicians and researchers to appraise the reliability and internal validity of the study, the generalisability of trial findings, and to identify barriers that may impede implementation of the intervention [29, 30]. Consolidated Standards of Reporting Trials (CONSORT) guidelines require reporting of intervention fidelity in nonpharmacological trials [31], and it is recommended that researchers assess intervention providers’ acquisition of skills before the RCT commences to ensure they have been adequately trained to deliver the intervention [29, 32]. However, fidelity is often underreported in clinical trials [33]. In fact, a review of the implementation fidelity of physiotherapist-delivered education and exercise interventions for people with OA or chronic low back pain found that details about the training of providers was the most poorly reported aspect of fidelity across all 22 included studies [34]. The aim of this study was to evaluate the fidelity of Telecare physiotherapists to a person-centred practice and behaviour change methodology immediately after training for a clinical trial. This study describes the lessons learnt and implications for future trials.

7.2 Methods

This study was nested within the Telecare RCT. A detailed study protocol for the Telecare trial has been published [12], including specific details of the intervention.

7.2.1 Participants

All eight physiotherapists that were employed to deliver care in the Telecare trial participated. Physiotherapists were recruited from Victoria, Australia, using the research
team’s clinician networks. Physiotherapist selection criteria were i) physiotherapy qualification; ii) at least two years of clinical experience treating patients with musculoskeletal conditions and; iii) current Australian registration to practice as a physiotherapist. All physiotherapists provided written informed consent and the institutional ethics committee approved the study.

7.2.2 Training program

Physiotherapists completed a training program delivered by HealthChange Australia (Core Training Part 1; [http://www.healthchange.com/](http://www.healthchange.com/)), which provides a health service delivery methodology (HealthChange® Methodology) that enables health service providers to embed person-centred care into clinical consultations, care planning, discharge planning, disease management, health promotion, rehabilitation, return to work and other health services. HealthChange® Methodology provides a clinical practice decision framework that enables health service providers to systematically and consistently deliver person-centred health services for improved client health literacy, shared decision-making, self-management and behaviour change. The Methodology integrates numerous models and theoretical concepts of behaviour change, addressing three main processes to optimally facilitate health behaviour change in clients: i) formulating a behavioural goal intention, ii) converting intention into action and self-regulation, and iii) person-centred communication processes [35]. HealthChange® Methodology defines a set of person-centred practice principles and techniques that allow and encourage self-reflection, as well as enabling assessment of how well the intervention is implemented.
The training program comprised two back-to-back training days run by a senior facilitator (CB, a musculoskeletal physiotherapist) from HealthChange Australia in a workshop-style format. This involved lectures, practice activities, group discussions, and video demonstrations of how to apply person-centred practice principles and techniques in clinical scenarios. The workshop provided training in how to apply HealthChange® Methodology’s nine person-centred practice principles, seven essential behaviour change techniques (Table 1), and 10 Step Decision Framework (Figure 1), in clinical practice. Physiotherapists were provided with lecture notes, and a mini-guide summarising HealthChange® Methodology principles and techniques. At the end of the workshop, physiotherapists were provided with a structured consultation framework to use during their initial and follow-up telephone consultations for the randomised controlled trial, embedded within online treatment notes, with prompts for when, and how, to use HealthChange® Methodology in their consultations.

Table 1. HealthChange® Methodology person-centred practice principles and essential behaviour change techniques.

<table>
<thead>
<tr>
<th>Person-centred practice principles</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client-centred, Client choice, Client Control</td>
<td>A practice principle that prompts clinicians to be person-centred by balancing duty of care with patients' rights to make fully informed, conscious decisions about what actions they will take. Encourages respect for autonomy and choice wherever possible.</td>
</tr>
<tr>
<td>Call it as you see it (with tact)</td>
<td>A practice principle that prompts clinicians to engage in honest and open communication with patients and refrain from engaging in pretence in relation to patients' readiness to take action. Calls for clinicians to tactfully highlight contradictions in a person’s behaviour with regard to readiness.</td>
</tr>
<tr>
<td>Four aspects of goal setting</td>
<td>A practice principle that outlines four aspects that need to be considered when setting health and quality of life goals with patients: 1) objective clinical targets; 2) behavioural treatment, lifestyle and referral categories; 3) short-term behavioural personalised health goals; 4) motivational drivers. Structures goal setting processes to be systematic and effective.</td>
</tr>
<tr>
<td>One thing at a time, One step at a time, Adding up over time</td>
<td>A practice principle that prompts clinicians to engage patients in goal setting and action planning in manner that ensures goals and actions are realistic, manageable and clinically effective over time.</td>
</tr>
</tbody>
</table>
Chapter 7. Fidelity to behaviour change and person-centred methodology

The RICk Principle®

A practice principle that prompts clinicians to consider that in order to take action on recommendations, patients need to be Ready, think the actions are Important enough to do, have the Confidence to do them, and have enough knowledge about what they are trying to do and why, so that they are more likely to take and sustain action over time.

First ask, then offer

A practice principle that prompts clinicians to check patients’ existing knowledge and ideas prior to offering information, education or suggestions. Used to identify correct understanding, knowledge gaps and misinformation and allow tailored provision of information.

Wait ‘til 8

A practice principle that prompts clinicians to provide patients with adequate thinking time (8 seconds) to formulate responses to questions that need consideration.

Invite the client to write

A practice principle that prompts clinicians to invite patients to write down any aspects of a consultation that they might wish to review later.

Trial & error

A practice principle that prompts clinicians to encourage a trial and error approach to taking action and changing complex behaviours so that patients are more likely to persevere in the face of barriers to action.

<table>
<thead>
<tr>
<th>Essential behaviour change techniques</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client first</td>
<td>A technique that provides a formula to construct phrasing to operationalise the ‘First Ask’ part of the First Ask, then Offer principle to elicit patient knowledge and ideas prior to offering information.</td>
</tr>
<tr>
<td>Menu of options</td>
<td>A technique that provides a formula to construct phrasing to operationalise the ‘then Offer’ part of the First Ask, then Offer principle to offer information and choice in a person-centred way.</td>
</tr>
<tr>
<td>RICk Radar®</td>
<td>A technique that prompts clinicians to consider both verbal and non-verbal cues regarding patients’ Readiness, Importance, Confidence and knowledge levels relating to taking recommended actions and to detect ambivalence to taking action.</td>
</tr>
<tr>
<td>RICk –focused decisional balance</td>
<td>An extended decisional balance technique that incorporates actively assessing, building and reinforcing Readiness, Importance, Confidence and knowledge (health literacy) into the process of inquiring about the pros and cons of two sides of a decision.</td>
</tr>
<tr>
<td>Changing thinking habits</td>
<td>A technique that provides clinicians with a formula to construct phrasing to identify everyday thinking barriers that may impact on patients’ ability to carry out agreed tasks within the agreed time frame.</td>
</tr>
<tr>
<td>Tracking &amp; monitoring</td>
<td>Techniques that enable clinicians and patients to track behaviours and monitor outcomes for the purpose of assessing and reinforcing progress. To be included in action plans.</td>
</tr>
</tbody>
</table>

RICk: Readiness, Importance, Confidence, knowledge
7.2.3 Patient consultations

Following training, each physiotherapist was randomly assigned four patients with knee osteoarthritis in order to practice implementing the person-centred practice principles and techniques taught. These patients were volunteers recruited from the community using the same inclusion criteria as those in the Telecare trial [12]. Each physiotherapist made two telephone calls to each patient (total of 8 consultations per physiotherapist). The aim of the initial consultation (approx. 45min) was to commence the patient on a structured strengthening program and/or an action plan to increase physical activity levels. The follow-up consultation two weeks later (approx. 20min) aimed to review progress and modify the program/plan as needed, using person-centred practice principles to proactively overcome barriers to following the advice provided at the initial consultation.
Patients were provided with an information folder that aimed to increase their knowledge about osteoarthritis and its management, the role of exercise and physical activity, and strategies for fatigue management. A personal self-management plan was also included, as well as exercise instructions, and a diary to record exercise adherence and knee symptoms. Patients were also provided with access to a study website with video demonstrations of home exercises. All calls were audio-recorded using an application (“TapeACall” iPhone and Android App, TelTech, New Jersey USA) downloaded to each physiotherapist’s mobile telephone.

7.2.4 **Fidelity assessment**

To assess fidelity to the delivery of HealthChange® Methodology, physiotherapists and the training facilitator completed audits of practice consultations. Using the audio recordings, physiotherapists were asked to self-audit 50% (to minimise physiotherapist burden prior to starting the main trial) of their consultations (including any two initial and two follow-up consultations), resulting in four audits each. The purpose of the self-audit was to reflect on their implementation of the person-centred practice principles and behaviour change techniques, including the language used and topics discussed with patients, during consultations. The self-audit form (Appendix G) comprised two sections assessing use of: i) HealthChange® Methodology’s 10 person-centred practice principles (rated using 11-point numerical rating scales ranging from 0 (“I need to work on this”) to 10 (“I am doing really well”)) and; ii) HealthChange® Methodology’s 7 essential behaviour change techniques (rated using ordinal scales with options of “I am already using this technique effectively”; “I need to improve my skill level in using this technique” or; “I need to learn how to apply this technique”). In addition, the training
facilitator (CB) independently audited all telephone consultations using an identical audit form.

7.2.5 Data analysis

Analysis was undertaken using the Statistical Package for the Social Sciences (SPSS, IBM corp., Version 22, Armonk USA). For each person-centred practice principle (continuous data) means and standard deviations of scores were calculated for physiotherapists and the training facilitator separately. Differences in physiotherapist and training facilitator ratings were estimated using linear mixed-effects models, which included a random intercept for physiotherapist to account for repeated measures on the same physiotherapist. Plots of residuals were checked to ensure validity of the usual assumptions of linear regression models (linearity, constant variance, and normality). Individual variations of person-centred practice principle scores across physiotherapists were represented graphically by plotting radar graphs of the scores obtained from the four consultations audited by both physiotherapists and the training facilitator in Microsoft Excel. Physiotherapist and training facilitator ratings for behaviour change techniques (ordinal data) were compared using chi-squared tests. All p-values were two-sided, with significance set at 0.05.

7.3 Results

The sample comprised an equal number of male (n=4) and female (n=4) physiotherapists, of mean (range) age of 35 (26-50) years and with 14 (4-28) years of clinical experience. Five (63%) worked exclusively in private practice, one (13%) exclusively in public practice, and two (25%) in a combination of private and public practice. Three (38%) had
previously participated in a day or weekend course in behaviour change support/techniques (not specifically in HealthChange® Methodology).

Three telephone calls were not recorded (two initial consultations and one follow-up, from different physiotherapists), leaving a total of 61 calls across 32 patients with knee osteoarthritis (mean (SD) age 60.8 (8.4) years, 29 (91%) female). Each physiotherapist completed the required number of self-audits, and the training facilitator audited all 61 (100%) of the recorded consultations. All but two physiotherapists audited initial and follow-up consultations that were with the same patient. As physiotherapists had three months to complete two consultations with each of their patients, the timing of telephone calls was not standardised, instead dictated by physiotherapist and patient availability. Therefore, many (six of eight) physiotherapists had already completed initial and follow-up calls with their first patient, before moving on to their second. Most (seven of eight) physiotherapists audited their very first four telephone consultations, with one physiotherapist auditing some later consultations.

7.3.1 Use of person-centred practice principles

Table 2 reports audit findings against the 10 person-centred practice principles. Average physiotherapist audit scores ranged from a mean (SD) of 5.5 (1.7) (“use the wait ‘til 8 technique to allow people time to think and respond to questions”) to 6.9 (1.2) (“using a person-centred approach that promotes a person’s choice and control”) out of 10. The average training facilitator audit scores ranged from 6.2 (1.2) (“address all four aspects of goal setting when discussing and setting goals with a person”) to 7.0 (1.4) (“using a person-centred approach that promotes a person’s choice and control”). Physiotherapists scored themselves significantly lower than the training facilitator for three principles: a)
“use the RICk principle to consider a person’s motivation for taking action” (mean difference (95% CI): -0.5 units (-1.0, -0.01)); b) “first ask a person for their input or permission before offering advice or asking for information” (-0.8 (-1.4, -0.2)); and; c) “use the wait ‘til 8 technique to allow people time to think and respond to questions” (-1.2 (-1.7, -0.6)). Figure 2 highlights the individual variation in implementation of person-centred practice principles within, and between, physiotherapists across consultations, and relative to the training facilitator.
### Table 2. Audit findings for person-centred practice principles.

<table>
<thead>
<tr>
<th>Category</th>
<th>Physiotherapist (n=32) Mean (SD)</th>
<th>Training facilitator (n=61) Mean (SD)</th>
<th>Mean difference (95% CI) between ratings</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using a person-centred approach that promotes a person’s choice and control</td>
<td>6.9 (1.2)</td>
<td>7.0 (1.4)</td>
<td>-0.1 (-0.7, 0.4)</td>
<td>0.669</td>
</tr>
<tr>
<td>Use call it as you see it principle to tactfully highlight contradictions in a person’s behaviour</td>
<td>6.7 (1.0)</td>
<td>6.4 (1.1)</td>
<td>0.2 (-0.3, 0.7)</td>
<td>0.370</td>
</tr>
<tr>
<td>Address all four aspects of goal setting when discussing and setting goals with a person</td>
<td>6.1 (1.1)</td>
<td>6.2 (1.2)</td>
<td>-0.1 (-0.6, 0.4)</td>
<td>0.601</td>
</tr>
<tr>
<td>Give people permission to focus on one thing at a time, one step at a time, adding up over time</td>
<td>6.6 (1.3)</td>
<td>6.9 (1.2)</td>
<td>-0.2 (-0.8, 0.3)</td>
<td>0.362</td>
</tr>
<tr>
<td>Use the RICK principle to consider a person’s motivation for taking action</td>
<td>6.3 (1.4)</td>
<td>6.8 (1.0)</td>
<td>-0.5 (-1.0, 0.0)</td>
<td>0.041</td>
</tr>
<tr>
<td>Use the RICK principle to consider a person’s confidence in carrying out agreed tasks</td>
<td>6.3 (1.3)</td>
<td>6.7 (1.2)</td>
<td>-0.4 (-0.9, 0.1)</td>
<td>0.082</td>
</tr>
<tr>
<td>First ask a person for their input or permission before offering advice or asking for information</td>
<td>5.8 (1.5)</td>
<td>6.6 (1.4)</td>
<td>-0.8 (-1.4, -0.2)</td>
<td>0.006</td>
</tr>
<tr>
<td>Use the wait till 8 technique to allow people time to think and respond to questions</td>
<td>5.5 (1.7)</td>
<td>6.7 (1.1)</td>
<td>-1.2 (-1.7, -0.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Invite the client (or other person) to write any information or tasks that they need to remember later</td>
<td>6.5 (1.5)</td>
<td>6.6 (1.5)</td>
<td>-0.1 (-0.6, 0.5)</td>
<td>0.790</td>
</tr>
<tr>
<td>Encourage a trial and error approach when helping a person to change their daily habits</td>
<td>6.3 (1.2)</td>
<td>6.5 (1.5)</td>
<td>-0.2 (-0.8, 0.4)</td>
<td>0.450</td>
</tr>
</tbody>
</table>

Scores are averaged across initial and follow-up consultations, and across physiotherapists, where n indicates the number of telephone consultations. RICK: Readiness, importance, confidence, knowledge; CI: confidence interval; n: number of telephone consultations. Ratings are out of 10, where 0 = I need to work on this, and 10 = I am doing really well.
Figure 2. Individual physiotherapist (PT) audit ratings for each person-centred practice principle
Scores displayed are for the four phone calls audited by both the physiotherapist and training facilitator. Ratings range from 0 to 10, where 0 = I need to work on this, and 10 = I am doing really well. RICK: readiness, importance, confidence, knowledge. Gaps indicate missing data.
Figure 2 cont. Individual physiotherapist (PT) audit ratings for each person-centred practice principle

Scores displayed are for the four phone calls audited by both the physiotherapist and training facilitator. Ratings range from 0 to 10, where 0 = I need to work on this, and 10 = I am doing really well. RICK: readiness, importance, confidence, knowledge. Gaps indicate missing data.
7.3.2 Use of essential behaviour change techniques

Figure 3 depicts the proportion of physiotherapists who were using each technique effectively, according to both self-audit and audit by the training facilitator. The training facilitator believed physiotherapists were using three of seven (43%) techniques effectively during the majority (>50%) of consultations, including: i) tracking and monitoring strategies; ii) RICk radar (intuition), and; iii) client first. The training facilitator believed that physiotherapists needed to improve their skill level using the techniques of changing thinking habits and menu of options in more than 50% of consultations. The technique of RICk-focused decisional balance was rated as not applicable by the training facilitator in >75% of consultations.

There were significant differences between physiotherapist and training facilitator ratings for four of seven techniques, with the therapists tending to rate themselves less favourably than the facilitator. For example, the training facilitator believed physiotherapists were using the techniques of RICk radar (intuition), ask RICk, and tracking and monitoring strategies “effectively” in a significantly higher proportion of consultations than the physiotherapists did. The training facilitator also rated the technique of “RICk-focused decisional balance” as being not applicable in significantly more consultations than the physiotherapists did.
Chapter 7. Fidelity to behaviour change and person-centred methodology

Figure 3. Behaviour change techniques across physiotherapist (PT) audits (n=32) and training facilitator (TF) audits (n=61).
7.4 Discussion

The aim of this study was to evaluate the fidelity of Telecare trial physiotherapists to a person-centred practice and behaviour change methodology immediately after training. The expert training facilitator felt that physiotherapists performed moderately well in implementing person-centred practice principles overall, but there was still room for improvement across all 10 principles. Although physiotherapists used three behaviour change techniques effectively during most consultations, the training facilitator felt that physiotherapists still needed to improve their skill level with two techniques. Physiotherapists’ self-ratings of performance were mostly consistent with the expert, however they tended to underestimate their ability to implement some of the principles and techniques, suggesting a lack of confidence, incomplete understanding of these principles/techniques, or a lack of awareness that they were actually using these techniques.

Despite undertaking an intensive two-day training workshop, our findings indicated that all physiotherapists had scope to further improve their skills in person-centred practice and behaviour change support. Our related qualitative study [36] explored physiotherapists’ experiences with the training program, finding that they all felt overwhelmed by the training content and believed that it deviated from their usual communication style. This indicates that physiotherapists were on a steep learning curve, which might explain why our audit findings indicated there was still room for improvement across the skills and techniques taught. These findings suggest that skill acquisition takes time and continued practice. We conducted a follow-up training day approximately three months after the initial two-day training workshop, where audit results were fed back to physiotherapists as a group and any difficulties or issues
encountered during the practice phase were discussed. Physiotherapists felt that this final training day helped increase their confidence using the methodology prior to commencing the Telecare trial [36]. As such, researchers planning RCTs may wish to consider assessing providers’ intervention fidelity during a practice or pilot phase, and provide group feedback on performance prior to the start of the RCT. In fact, evaluating treatment fidelity early in a study, such as during a pilot phase, is recommended for monitoring and enhancing treatment fidelity in public health clinical trials [33]. Further to this, providing standardised training to all providers, as well as a consultation script/checklist and standardised intervention manual, helps to ensure consistent knowledge translation, increasing the likelihood that the treatment delivery will not vary between providers [29, 33].

We found reasonable agreement between physiotherapists’ self-audit scores and the training facilitator’s audit scores for fidelity to person-centred principles and behaviour change techniques. This suggests that physiotherapists were able to make relatively accurate judgements about their skill level, indicating that, if researchers lack resources to implement an “expert” evaluation of intervention fidelity, provider self-audit of fidelity may be a reasonable substitute. However, our physiotherapists did significantly underestimate their skill level using three (of 10) person-centred principles and four (of seven) behaviour change techniques. This may reflect a lack of confidence in applying those principles and techniques, or may indicate that physiotherapists found them more difficult to learn and/or adopt into their practice. In fact, physiotherapists did report a lack of confidence after the first two training days in our related qualitative study [36]. Our findings might also simply reflect the fact that physiotherapists were inexperienced using the techniques, and so had a poor gauge of their skill level relative to an “expert”. There
is evidence that learners who are less competent are less able to accurately self-assess their skills (leading to either under- or over-estimation of skills) [37, 38]. However, a recent study also found evidence of good agreement between provider self-report and independently rated skills when assessing the fidelity of a self-management intervention for people with chronic low back pain or OA [39]. Similarly, general practitioners who received training in motivational interviewing self-rated their skills during patient consultations, and showed reasonable agreement with expert ratings [40]. However, there was a tendency for practitioners to underestimate their skills, similar to our findings amongst physiotherapists.

Our methods of assessing intervention fidelity have a number of strengths. By audio-recording and auditing consultations, we directly measured skill level with person-centred practice principles and behaviour change techniques in “real-time”, rather than relying on retrospective recall of performance by clinicians. Other researchers have also suggested that independently rated audio recordings and self-report checklists are the most acceptable and practical methods for assessing implementation fidelity in physiotherapy practice [39]. We also used self-audits alongside audits from an expert, which increases the robustness of our findings. Self-audit encourages self-reflection by the providers on their own individual performance and may serve as a stimulus for further practice and improvement of intervention fidelity. Our methods also had some limitations. As physiotherapists were free to audit a proportion of any of their consultations, it is possible that they opted to audit their “best” consultations. Future RCTs relying solely on provider self-audit of fidelity may wish to consider mandating all practice consultations be audited to minimise the risk of intervention fidelity being overestimated. In addition, the expert audits in our study were performed by a single individual, who had delivered the training
and thus had some familiarity with the eight physiotherapists. Future RCTs may wish to consider using an expert independent from the training facilitator to minimise any risk of bias. In addition to observation/recording of consultations, Bellg and colleagues [29] recommend administering pre- and post-training questionnaires to assess skill acquisition, which was not performed in our study, but may be considered for future RCTs as an additional measure of fidelity.

7.5 Conclusions

Physiotherapists performed moderately well when implementing person-centred practice principles and behaviour change techniques immediately after training, but with room for improvement from further practice and/or training prior to Telecare trial commencement. Physiotherapists’ self-ratings of performance generally agreed with expert ratings, however they underestimated their ability to implement some principles and techniques. Our findings suggest that researchers should consider incorporating “refresher” training, after a period of practice, prior to trial commencement to maximise intervention fidelity.

References


Chapter 8 “I was really sceptical...But it worked really well”:
a qualitative study of patient perceptions of telephone-
delivered exercise therapy by physiotherapists for people with
knee osteoarthritis


Author contribution for this chapter are the following: study conception and design (RSH, BJL, KLB, CD); data collection (BJL); data analysis (BJL, CD) and interpretation of data (all authors); drafting of the manuscript (BJL); critical revision of the manuscript (all authors). All authors approved the final version of the manuscript.

This study was supported by funding by the National Health and Medical Research Council (Partnership Project #1112133 and Centre of Research Excellence (#1079078)) and the Medibank Better Health Foundation, with in-kind support from MOVE muscle, bone and joint health (formerly Arthritis & Osteoporosis Victoria), HealthChange Australia and the Australian Physiotherapy Association. RSH is supported by Australian Research Council Future Fellowship (FT130100175). BJL is supported by a PhD stipend.
from the National Health & Medical Research Council Centre of Research Excellence (#1079078). KLB is supported by a National Health & Medical Research Council Fellowship (#1058440).
Chapter 8. Patient perceptions of telephone-delivered exercise

Accepted Manuscript

“I was really sceptical...But it worked really well”: a qualitative study of patient perceptions of telephone-delivered exercise therapy by physiotherapists for people with knee osteoarthritis

Belinda J. Lawford, BMedSci, BHlthSci(Hons), Clare Delany, BPhysio, MHlth&Med Law, MPhysio, PhD, Kim L. Bennell, BAppSci(Physio), PhD, Rana S. Hinman, BPhysio(Hons), PhD

PII: S1063-4584(18)31106-3
DOI: 10.1016/j.joca.2018.02.909
Reference: YJOC4199

To appear in: Osteoarthritis and Cartilage

Received Date: 15 November 2017
Revised Date: 21 February 2018
Accepted Date: 28 February 2018

Please cite this article as: Lawford BJ, Delany C, Bennell KL, Hinman RS, “I was really sceptical...But it worked really well”: a qualitative study of patient perceptions of telephone-delivered exercise therapy by physiotherapists for people with knee osteoarthritis, Osteoarthritis and Cartilage (2018), doi: 10.1016/j.joca.2018.02.909.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.
"I was really sceptical...But it worked really well": a qualitative study of patient perceptions of telephone-delivered exercise therapy by physiotherapists for people with knee osteoarthritis

Lawford, Belinda J\(^1\) BMedSci, BHlthSci(Hons) lawfordb@student.unimelb.edu.au

Delany, Clare\(^2\) BPhysio, MHIth&Med Law, MPhysio, PhD c.delany@unimelb.edu.au

Bennell, Kim L\(^1\) BAppSci(Physio), PhD k.bennell@unimelb.edu.au

Hinman, Rana S\(^1\) BPhysio(Hons), PhD ranash@unimelb.edu.au

\(^1\)Centre for Health, Exercise and Sports Medicine, Department of Physiotherapy, School of Health Sciences, The University of Melbourne, Victoria, Australia

\(^2\)Department of Medical Education, The University of Melbourne, Victoria, Australia

Correspondence and reprints:
Dr Rana Hinman, Centre for Health Exercise and Sports Medicine, Department of Physiotherapy, School of Health Sciences, University of Melbourne, Parkville, Victoria, 3010. ph: +61 3 8344 3223, fax: +61 3 8344 4188, ranash@unimelb.edu.au

Key words: Osteoarthritis; exercise; physiotherapy; telerehabilitation; telephone; qualitative.

Running Head: Telephone-delivered exercise therapy

Word Count: 3984
Chapter 8. Patient perceptions of telephone-delivered exercise

Abstract (241 words)

Objective. Physiotherapists typically prescribe exercise therapy for people with osteoarthritis (OA) via face-to-face consultations. This study aimed to explore peoples’ perceptions of exercise therapy delivered by physiotherapists via telephone for their knee OA.

Design. A qualitative study (based on interpretivist methodology) embedded within a randomised controlled trial. Semi-structured individual interviews were conducted with 20 people with knee OA who had received exercise advice and support from one of eight physiotherapists via telephone over six months. Interviews were audio recorded, transcribed verbatim and thematically analysed.

Results. Although people with OA were initially sceptical about receiving exercise therapy via telephone, they described mostly positive experiences, valuing the convenience and accessibility. However, some desired visual contact with the physiotherapist and suggested including video-conferencing calls or an initial in-person clinic visit. Participants valued the sense of undivided focus and attention they received from the physiotherapist and believed that they were able to communicate effectively via telephone. Participants felt confident performing their exercise program without supervision and described benefits including increased muscular strength, improved pain, and ability to perform tasks that they had not been previously able to.

Conclusions. People with knee OA held mostly positive perceptions about receiving exercise therapy from a physiotherapist via telephone, suggesting that such a service is broadly acceptable to consumers. Such services were generally not viewed as a substitute for face-to-face physiotherapy care, but rather as a new option that could increase accessibility of physiotherapy services, particularly for follow-up consultations.
Chapter 8. Patient perceptions of telephone-delivered exercise

46 **Introduction**

47 Knee osteoarthritis (OA) is a common health condition affecting 24% of the adult population [1]. Clinical guidelines advocate exercise as a core component of non-surgical management of OA [2-5], irrespective of age, comorbidity, or severity of symptoms. High-quality evidence indicates that therapeutic exercise, particularly muscle strengthening, can significantly improve pain, physical function, and quality of life in people with knee OA [6]. Advice to increase physical activity and reduce sedentary behaviour is also important. Most people with knee OA do not meet physical activity guideline recommendations for good health [7], and those who are sedentary have poorer physical function [8, 9].

56 Despite clinical guideline recommendations, participation in exercise and physical activity is generally low amongst people with OA [10-13]. Although barriers to exercise participation in this population are diverse and multi-factorial [14, 15], our scoping review has shown that the barriers reported by people frequently relate to the environmental context and resources available to the person, as well as individual beliefs about both capabilities to exercise and consequences of exercise participation [14]. A recent systematic review of patients’ perceived health service needs for OA care highlighted that access to physiotherapy care and exercise therapy is important, yet a range of system barriers (such as lack of service provision, inconvenient appointment times and venue location) contribute to poor uptake [15]. Patient factors, such as disinterest, physical limitation, and financial costs, also play a role. It is thus important that accessible models of service delivery, incorporating methods that support behaviour change and self-management skills, are developed to improve exercise uptake and reduce the burden of knee OA.
Telerehabilitation is the provision of rehabilitation services via technology [16], and offers an innovative way of providing physiotherapy services to people with OA [17]. Remote models of service delivery may improve the accessibility of care by allowing people to consult with a physiotherapist from the convenience of their own home or workplace. Other advantages include increased flexibility regarding appointment times, reduced costs and/or loss of time associated with traveling to/from clinics, and improved accessibility for those who are physically or geographically unable to attend a clinic in-person. Furthermore, the ‘hands-off’ nature of telerehabilitation may foster more realistic patient expectations about consultation goals, and may encourage self-management rather than expectations of a ‘quick fix’ often associated with delivery of more passive, ‘hands-on’ therapies [18]. There is some evidence to support the effectiveness of exercise therapy delivered by physiotherapists via sophisticated videoconferencing software for people who have undergone knee arthroplasty [19], and via Skype™ for people with knee OA [20]. There is also preliminary evidence to support telephone-delivered care for people with OA [21], and the UK-based telephone-delivered physiotherapy service ‘PhysioDirect’ has been shown to be equally effective as usual care for people with musculoskeletal conditions [22]. Telephone-delivered services potentially offer a more accessible and affordable option for many as they do not require access to a computer/laptop or high-speed internet, or the skills required to operate these technologies efficiently.

When investigating new models of service delivery, it is important to consider the attitudes and experiences of users, particularly the acceptability of the service. Our recent survey found that most people with OA have no prior experience with telerehabilitation [23]. Respondents were thus unsure about the potential effectiveness of telephone-delivered exercise therapy by a physiotherapist, and expressed some concern about the lack of physical contact. The aim of
Chapter 8. Patient perceptions of telephone-delivered exercise

Methods

Design

A qualitative design based on interpretivist paradigm was used to explore participants’ perspectives of telephone-delivered exercise therapy. According to an interpretivist paradigm, knowledge about a phenomenon is developed by gathering perceptions and interpretations of participants who experience it [24].

This qualitative study was nested within our ongoing randomized controlled trial (RCT) evaluating the effectiveness of incorporating exercise advice and behaviour change support by physiotherapists into an existing Australian nurse-led national musculoskeletal telephone service for adults with knee OA (Australian New Zealand Clinical Trials Registry ANZCTR 12616000054415) [25]. The Consolidated Criteria for Reporting Qualitative Research checklist was used to ensure complete and transparent reporting of this qualitative study [26].

Participants

Participants with knee OA were recruited as key informants from our RCT. Selection criteria for enrolment into the RCT have been previously published [25]. Briefly, eligible participants met the National Institute for Health and Care Excellence OA clinical criteria (aged 45 years or over, had activity-related joint pain and morning stiffness ≤30 minutes) [2], had average knee pain of ≥4 on 11-point numeric rating scale, and a history of knee pain for at least three months. Participants were recruited from metropolitan, regional, and rural Australia via
Chapter 8. Patient perceptions of telephone-delivered exercise

At enrolment, participants were not aware the trial was specifically evaluating exercise therapy from a physiotherapist, but were told that the trial was comparing different forms of knee OA advice and support from “healthcare professionals” via telephone. Between February and October 2017, participants from the intervention arm who had completed their 6-month follow-up were consecutively invited to participate in this qualitative study. All interviews were conducted within six months of the participant having completed the intervention. The final sample was dictated by the principle of theoretical saturation, where no new themes or sub-themes emerged from the data [27]. All participants provided written informed consent and the institutional ethics committee approved the study.

The intervention has been published in detail [25]. Table 1 summarises the key elements. Briefly, all participants (including those in the control arm of the RCT) received an initial telephone call for general OA information and advice from a nurse employed by the Musculoskeletal Help Line (administered by MOVE muscle, bone and joint health, Victoria, Australia). Participants then received 5-10 telephone calls over a six-month period by one of eight trial physiotherapists, who had been specifically trained in person-centred practice and behaviour change support. Initial telephone calls were approximately 40 minutes in length, with follow-up calls approximately 20 minutes. In collaboration with the participant, physiotherapists devised goals and an action plan that involved both a structured home strengthening exercise program and a physical activity plan. Over subsequent consultations, physiotherapists adjusted the program and goals as necessary, and provided support by
increasing participant knowledge and understanding of knee OA and the benefits of exercise. Physiotherapists also utilised skills taught during the training in person-centred care and behaviour change support [28] to increase participant’s motivation to exercise and build confidence in their ability to undertake, and adhere to, an exercise program. This involved helping participants formulate a behavioural goal intention and convert that intention into action and maintenance, as well as communicating in a person-centred manner that promotes health literacy, shared decision-making, and self-management [29].

To support telephone consultations, participants were provided with an information folder containing information about OA and its effective management, the role and benefits of physical activity, and strategies for fatigue management. It also included a template of a self-management plan, exercise instructions and photos, and a diary to record exercise adherence and knee symptoms. Participants were provided with three resistance bands for home exercises as well as access to a study website containing video demonstrations of each exercise.

Interviews

Semi-structured interviews were developed (Table 2) using the Donabedian framework [30] as a guiding conceptual model in which to situate participant’s perceptions. This framework has been previously used for quality assessment in healthcare and advocated as a useful model for reviewing physiotherapy services [31]. It considers three elements of healthcare quality: i) structure (environment where the service is provided); ii) process (clinician and patient activities in delivering/receiving care) and; iii) outcome (effects of the care provided).
Chapter 8. Patient perceptions of telephone-delivered exercise

Individual interviews were conducted over the telephone by BJL, a graduate research student trained in qualitative methodologies (who is not a clinician) and who had no other involvement or contact with research participants. Interviews were audio recorded and transcribed verbatim by an external provider of transcription services. Pseudonyms were assigned to each participant for confidentiality purposes. All data were de-identified and stored in digital format on a password-protected university server.

Data analysis

Analysis was based on a thematic approach [32]. Individual transcripts were read through by BJL soon after transcription, and then re-read and coded to identify topics and initial patterns of ideas emerging from the data. Codes were organised into categories and combined with similar or related ideas from across all participant data to form themes. As the questions were initially framed according to the three elements of the Donabedian framework (process, structure, and outcome [30]), the patterns and emerging themes were also recorded under these headings. Thematic categories were reviewed and revised by BJL and a qualitative expert (CD) who had no contact with participants. The overall themes were divided into sub-themes, which were further reviewed and discussed with all members of the research team [33]. To ensure credibility and confirmability of the data, another researcher (RSH) read all transcripts prior to discussion of the themes/sub-themes that were developed by BJL and CD.

All analytical steps were performed using standard word processing rather than qualitative analysis software.

Results

Participants
Table 3 describes each of the twenty participants (Table 3). Over half (65%) were female, and participants spanned both regional (40%) and metropolitan (60%) areas. On average, participants had 7 telephone consultations with the physiotherapist.

From the interviews, five themes spanning the structure (Table 4), process (Table 5) and outcomes (Table 6) of the intervention were identified. Between two and five subthemes were identified in all but one of the themes.

Structure of telephone-delivered exercise therapy (Table 4)

Two themes relating to the structure of telephone-delivered care arose, “positive experiences using the telephone”, and “desire for visual contact”. Some participants reflected on initially feeling sceptical about the quality of care they would receive via telephone, feeling unsure about the lack of physical and visual contact. These attitudes changed once they began their telephone consultations, with participants believing that consulting via telephone “worked really well”. Participants were enthusiastic about the potential of telephone consultations for future service delivery, and some believed that it was “just as good if not better” than consulting with a physiotherapist face-to-face. Consulting from the comfort of their own home allowed them to speak more freely to the physiotherapist and brought the exercise program into their everyday environment, which helped them integrate it into their lifestyle.

Participants praised how time-efficient and flexible consulting via telephone was, allowing them to talk to the physiotherapist at a time and place convenient to them. Participants felt telephone consultations provided an excellent option for people in rural areas or those who want to avoid the inconvenience of travelling to a clinic or missing time at work.
Some participants expressed a desire for visual contact with the physiotherapist. This mostly stemmed from concerns about the fact that the physiotherapist could not see their knee and/or observe their exercise technique, and was instead forced to rely on the participant’s “description of what’s wrong”. Desire for visual contact was believed to be particularly important for other people who lack confidence in their exercise technique, and may “need to be shown the exercises”. It was suggested that telephone-delivered care could be supplemented by video-conferencing (e.g. Skype) or face-to-face in-clinic visits, particularly for the first few consultations, to overcome perceived limitations of the lack of visual contact.

Two themes relating to the process of telephone-delivered care arose, namely “dedicated care” and “confidence performing exercise”. Participants believed that the physiotherapist provided care that was personalised and tailored to their individual environment and/or capabilities. Participants valued the feeling of ongoing support from the physiotherapist, believing that it helped them remain motivated and encouraged them to continue their exercise program. Participants felt it was easy to communicate effectively with the physiotherapist, feeling that the physiotherapist “listened” to them and created a sense that their knee problems “were being heard”. Telephone calls provided participants with a sense of undivided focus and attention from the physiotherapist, making consultations feel “more personal” than traditional face-to-face consultations. Participants felt they could “get down to talking about what was really important”.

Although some desired more visual contact with the physiotherapist, all felt confident performing their exercise programs. They felt the exercise resources, particularly the photos and written instructions, were easy to follow and the physiotherapist’s verbal descriptions of
each exercise were easy to understand. With the support of the physiotherapist, participants believed that they were easily able to implement their exercise program into their daily life.

Outcomes after telephone-delivered exercise therapy (Table 6)

Regarding the outcomes of care, a single theme of “health benefits” arose. Participants believed the intervention helped increase their muscular strength, which helped them “move around a bit easier”. Participants also felt that their knee pain had improved. Improvements in confidence, knee pain and physical capabilities led to participants “breaking barriers” to do things they had previously stopped doing, such as walking to the shops.

Discussion

The aim of this study was to explore peoples’ perceptions of exercise therapy delivered by physiotherapists via telephones for their knee OA. We found that participants described mostly positive experiences, valuing the convenience of calls from home and the sense of ongoing, personalised support provided by the physiotherapist. Although participants generally felt confident performing their exercise program, some still desired visual contact with the physiotherapist, either via video-conferencing or in-person visits. Our findings suggest that telephone-delivery is an accessible and generally acceptable option to provide personalised, supportive exercise therapy from a physiotherapist for knee OA, particularly for follow-up consultations.

Our findings reflect those of previous qualitative studies exploring people’s experiences receiving care from a physiotherapist via telephone or video-conferencing. People with knee OA who received exercise therapy from a physiotherapist via Skype™ also described positive experiences, emphasising convenience and a sense of personal, undivided attention, as well as
feeling empowered to self-manage [18]. For telephone-delivered services, people with
musculoskeletal conditions who received advice from physiotherapists via PhysioDirect in the
UK found the service to be accessible, convenient, and efficient [34]. However, people using
PhysioDirect felt that the service was impersonal, and that it was difficult to describe their
symptoms via telephone, and hence believed face-to-face care was more valuable. This
contrasts with our findings, where our participants described effective communication with
their physiotherapist, and felt that the telephone calls were “more personal” than face-to-face
consultations. There are a number of potential reasons for these contrasting findings.
PhysioDirect is designed to provide initial advice for people with any acute or chronic
musculoskeletal condition, who may not necessarily have received a diagnosis before
accessing the service. Thus, assessment and diagnosis is likely to be more important to
PhysioDirect users than for participants in our study, who already knew they had chronic knee
pain likely to be OA, and where the goal of treatment was focussed on exercise management.
Additionally, users of PhysioDirect are unlikely to speak to the same physiotherapist more
than once [22]. In our study, participants were assigned a physiotherapist who they spoke to at
least five, and up to 10, times over six months. Participants in our study also completed an
individual pre-treatment assessment form, including details about personal goals and
hobbies/interests, which was provided to the physiotherapists and may have contributed to the
sense of a more “personalised” relationship.

Participants in our study believed that telephone-delivered physiotherapy was convenient and
efficient, allowing them to consult with the physiotherapist from their home or work, as well
as while travelling or on holiday. This is a particularly important finding given that common
barriers to accessing physiotherapy services for knee OA include inconvenient appointment
times or locations [15]. Participants also commented on the impact of being in their home
environment and believed that consulting from home allowed them to put their exercise program “in location” and better integrate it into their everyday life. This reflects an ecological model of health behaviour [35], where physical environment (e.g. perceived safety, comfort, accessibility, and convenience) has been shown to have an important influence on health behaviours like physical activity. This may potentially facilitate long-term changes in behaviour and adherence to exercise, though further investigation is required to confirm this.

Despite the lack of physical and visual contact, participants perceived that physiotherapists provided supportive and dedicated care over the telephone, and felt they were able to communicate effectively. These findings may seem counterintuitive given that participants did not see their therapist in-person, and also given the important role physical touch plays in developing trust between physiotherapists and their patients [36-38]. However, there is growing evidence that a strong therapeutic alliance, conceptualised as the sense of collaboration, warmth and support between a client and therapist [39, 40], can exist without face-to-face contact [41-45]. Using the telephone required our physiotherapists to focus on communicating effectively, perhaps more so than in traditional face-to-face consultations. The only source of information available to the physiotherapists (other than the pre-treatment survey) was what the patient could tell them. There is evidence that therapeutic alliance is strengthened when the clinician listens to what the patient has to say and asks questions with a focus on emotional issues [46]. Participants in our study felt like they were being “listened to” by the physiotherapist, that their problems were “being heard”, and they could spend more time “talking about what was really important”. Our findings counter common misconceptions that telehealth is “impersonal” [47] and instead suggest that telephone-delivered care can provide supportive, personalised care, if clinicians are appropriately trained (elaborated below) and the service is adequately tailored to the needs of the users.
Many participants in our study were sceptical at first about the effectiveness of telephone-delivered care, feeling unsure about the lack of visual or physical contact with the therapist. This reflects the findings of our recent survey, where people with knee and/or hip OA, most of whom had no experience with telerehabilitation, were unsure about the effectiveness of telephone-delivered exercise therapy, and were unsure whether a physiotherapist would be able to adequately monitor their condition via telephone [23]. In addition, 80% of the 330 people who completed that survey thought that they would feel unsure about or would dislike the lack of physical contact with the physiotherapist when consulting via telephone [23]. Those findings appear to contrast with the actual experience of receiving care via telephone. Our participants described a range of personal health benefits from receiving care including increased muscle strength and reduced pain, and no participant expressed that the lack of physical contact with the therapist was an issue. This suggests that people with OA may be reluctant to engage with telephone physiotherapy services initially, and may need reassurance about the safety and effectiveness of care that does not involve physical or visual contact.

Interestingly, some participants in our study expressed a desire for visual contact with the physiotherapist so they could observe their exercise technique or “see what’s wrong” with their knee. This was in spite of the fact that all participants believed their exercise programs were easy to understand, and they all felt confident in their ability to perform the exercises. It is therefore not entirely clear why some participants still desired visual contact with the physiotherapist. These perceptions may stem from preconceptions about physiotherapy care, or perhaps wanting “visual” reassurance that they were performing their exercises correctly. To our knowledge, no previous studies have investigated the role of visual contact in the delivery of exercise by a physiotherapist, and whether the absence of visual contact impacts
exercise technique or effectiveness. Further research is also required to determine whether the physiotherapists themselves desired visual contact with patients or if they had difficulties prescribing exercise remotely.

In general, participants did not perceive telephone-delivered exercise management to be a substitute for face-to-face physiotherapy care, but rather viewed it as a new option for care that could increase accessibility of physiotherapy services. Our findings have a number of implications for future implementation and design of such services. The desire for visual contact indicates that service providers should consider providing patients the option of having an initial face-to-face consultation, and/or the option for video-conferencing, particularly in the early stages of an episode of care. Participants felt that telephone consultations could be particularly useful for follow-up consultations, and could provide ongoing support over a longer period of time than is usually provided by traditional in-person physiotherapy services. Participants in our study highly valued the exercise resources that were provided (i.e. information folder with exercise instructions and pictures). As such, service providers should consider supplying similar resources to their patients to ensure that they feel comfortable and confident completing their exercise program. Future services should also include the use of pre-treatment questionnaires, as this likely helped our physiotherapists provide a sense of personalised care.

Although physiotherapists are routinely trained in communication skills in entry to practice physiotherapy degrees, this is typically in the context of face-to-face care. Telephone consultations require person-centred practice skills that include active listening and advising [48]. Thus, it is important to consider the training needs of clinicians involved in the delivery of care via telephone. Currently, there is no evidence available to inform the training of
clinicians in telephone communication skills [49], and instead service providers must rely on studies and models based on face-to-face communication, which does not consider the unique needs of remote non-visual consultations. The physiotherapists in our study underwent an intensive training programme in person-centred practice and behaviour change support before commencing the intervention, in which communication is a central component. Our training program included an initial two-day workshop, three-months of practice telephone consultations with four patients (per physiotherapist), and a final one-day workshop. Practice consultations were also audited by the training facilitator, as well as by the physiotherapists themselves, to assist in skill acquisition. As such, our physiotherapists felt confident and prepared to begin the trial, and also felt that they were better able to provide care that was person-centred [28]. Similarly, all physiotherapists who are involved in the PhysioDirect service are also required to complete training to enhance their listening and interviewing skills, involving one-and-a-half days of workshops, a period of practice and skills consolidation, and a competency check where physiotherapists are observed while assessing patients via telephone [50]. Service providers who are considering telephone-delivery should also proactively train their physiotherapists to ensure that they are appropriately skilled to deliver effective care via telephone.

A strength of our study is that we interviewed a wide range of participants, including males and females of varying ages and occupational status, ranging from being underweight to morbidly obese, and spanning regional and metropolitan regions of Australia. In addition, our use of the Donabedian framework helped ensure we were able to yield comprehensive information regarding the structure, process, and outcomes of telephone care. Our study also had some limitations. Our participants volunteered to participate in both the overarching clinical trial and the qualitative interviews, and thus our data may be biased towards those
who are more receptive to telephone-delivered advice, had more positive experiences or were
more inclined to share their thoughts and experiences. Our participants were constrained to
English speaking people and it is not possible to generalise these findings to telephone
services that require an interpreter. Finally, 15 of our 20 participants (75%) had completed at
least some tertiary education, and so our findings may not reflect the perceptions of people
with lower levels of education.

In summary, people with knee OA held mostly positive perceptions about receiving exercise
therapy from a physiotherapist via telephone, suggesting that such a service is broadly
acceptable to consumers. Such services were generally not viewed as a substitute for face-to-
face physiotherapy care, but rather as a new option that could increase accessibility of
physiotherapy services, particularly for follow-up consultations. Future studies are required to
the perceptions and interpretations of the physiotherapists who provide care via telephone.
Chapter 8. Patient perceptions of telephone-delivered exercise

Author contributions

The authors declare the following contributions to the preparation of the manuscript: study conception and design (RSH, BJL, KLB, CD); data collection (BJL); data analysis (BJL, CD) and interpretation of data (all authors); drafting of the manuscript (BJL); critical revision of the manuscript (all authors). All authors approved the final version of the manuscript.

Role of the funding source

This work is funded by the National Health and Medical Research Council (Partnership Project #1112133 and Centre of Research Excellence (#1079078)) and the Medibank Better Health Foundation, with in-kind support from MOVE muscle, bone and joint health (formerly Arthritis & Osteoporosis Victoria), HealthChange Australia and the Australian Physiotherapy Association. RSH is supported by Australian Research Council Future Fellowship (FT130100175). BJL is supported by a PhD stipend from the National Health & Medical Research Council Centre of Research Excellence (#1079078). KLB is supported by a National Health & Medical Research Council Fellowship (#1058440).

Conflict of interest

None to declare.
Chapter 8. Patient perceptions of telephone-delivered exercise

References


## Table 1. Key elements of the exercise therapy intervention delivered by physiotherapists

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provision of resources</strong></td>
<td>Each participant received:</td>
</tr>
<tr>
<td></td>
<td>- An information folder: to increase knowledge about OA and its management, role and benefits of exercise and physical activity, strategies for fatigue management and client stories about positive experiences with exercise for OA; personal goal and self-management plans; exercise instructions; and a health diary to record adherence</td>
</tr>
<tr>
<td></td>
<td>- Three resistance bands for strengthening exercises</td>
</tr>
<tr>
<td></td>
<td>- Log-in access to a website with video demonstrations of exercises</td>
</tr>
<tr>
<td><strong>Pre-treatment survey</strong></td>
<td>Participants completed a pre-treatment survey prior to their first consultation with the physiotherapist which provided preliminary information regarding:</td>
</tr>
<tr>
<td></td>
<td>- Clinical history</td>
</tr>
<tr>
<td></td>
<td>- Knee symptoms</td>
</tr>
<tr>
<td></td>
<td>- Physical limitations</td>
</tr>
<tr>
<td></td>
<td>- Personal goals</td>
</tr>
<tr>
<td><strong>5-10 telephone calls from physiotherapist over 6 months</strong></td>
<td>Approximately 40 minutes (initial call) and 20 minutes (subsequent calls), involving:</td>
</tr>
<tr>
<td></td>
<td>- Person-centred approach to care</td>
</tr>
<tr>
<td></td>
<td>- Education about OA and the benefits of exercise</td>
</tr>
<tr>
<td></td>
<td>- Collaborative development of a personalised action plan comprising</td>
</tr>
<tr>
<td></td>
<td>- Individualised strengthening program</td>
</tr>
<tr>
<td></td>
<td>- Individualised physical activity plan</td>
</tr>
<tr>
<td></td>
<td>- Behaviour change support: building knowledge, motivation and confidence to undertake independent exercise and self-regulate, including plans to overcome barriers to adherence and; goal setting</td>
</tr>
<tr>
<td></td>
<td>- Monitoring progress: adjusting program and goals as required</td>
</tr>
</tbody>
</table>

**Strengthening exercises** | 5-6 exercises, aiming for 3 times/week, with exercise choice and dosage negotiated between therapist and patient |

| | Exercises selected from a pre-defined list [25], aim to include: |
| | - Quadriceps strengthening (two exercises) |
| | - Hip abductor strengthening (one exercise) |
| | - Hamstring strengthening (one exercise) |
| | - Calf strengthening (one exercise) |
| | - Optional extras (one exercise) |

**Physical activity plan** | Plan based on individual needs and goals |

| | Aim to increase general and incidental physical activity |
| | Encouraged to use health diary to record progress |
| | Encouraged to access local exercise services/facilities as appropriate |

**Training of physiotherapists** | All physiotherapists trained in behaviour change support using HealthChange® Methodology (HealthChange Australia), which includes: |

| | A set of practice principles to guide effective communication and knowledge transfer |
| | A set of techniques used to identify and address barriers to behaviour change |
| | 10-step decision framework that acts as a health behaviour change clinical pathway to guide decision-making |

Note: All participants received a single 25-40 min telephone call from a nurse employed by the Musculoskeletal Help Line (administered by MOVE muscle, bone and joint health, Victoria, Australia) prior to the physiotherapy telephone consultations. The nurse provided general information about OA and common treatments, assistance navigating social services, general emotional support and advice and linkage to community resources relevant for people with OA.
## Chapter 8. Patient perceptions of telephone-delivered exercise

### Table 2. Interview schedule

<table>
<thead>
<tr>
<th>Topic</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>1. What stands out most about your experience participating in the trial?</td>
</tr>
<tr>
<td></td>
<td>2. When you volunteered for the study, what were you expecting?</td>
</tr>
<tr>
<td></td>
<td><em>Who did you think you’d be speaking to?</em></td>
</tr>
<tr>
<td></td>
<td><em>How many calls did you expect you would receive?</em></td>
</tr>
<tr>
<td></td>
<td><em>What did you expect the telephone calls to be about?</em></td>
</tr>
<tr>
<td></td>
<td><em>Was there anything that took you by surprise, that you weren’t expecting?</em></td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>3. What stood out to you as the best things about receiving care via telephone?</td>
</tr>
<tr>
<td></td>
<td><em>Did you think there were any clear advantages of receiving care via phone?</em></td>
</tr>
<tr>
<td></td>
<td><em>Were there things you liked about it?</em></td>
</tr>
<tr>
<td></td>
<td>4. Was there anything challenging about receiving care over the phone?</td>
</tr>
<tr>
<td></td>
<td><em>Was there anything you didn’t like about consulting via phone?</em></td>
</tr>
<tr>
<td></td>
<td><em>Did you have any difficulties at any time?</em></td>
</tr>
<tr>
<td></td>
<td>5. How do you think it compared (or would compare) to consulting a health professional face-to-face?</td>
</tr>
<tr>
<td></td>
<td><em>How/why was it different/the same or better/worse?</em></td>
</tr>
<tr>
<td></td>
<td>6. How did the calls fit into the structure of your day?</td>
</tr>
<tr>
<td></td>
<td><em>Where were you when you had the telephone consultations?</em></td>
</tr>
<tr>
<td></td>
<td><em>Inside/outside? Home/work/somewhere else?</em></td>
</tr>
<tr>
<td></td>
<td><em>How did you feel about these locations?</em></td>
</tr>
<tr>
<td></td>
<td><em>Which areas were better/which were worse?</em></td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>7. Can you tell me what you remember about the information and advice you received over the phone?</td>
</tr>
<tr>
<td></td>
<td><em>Did you understand all of the advice or information given to you?</em></td>
</tr>
<tr>
<td></td>
<td>*Did you think it was relevant to you?</td>
</tr>
<tr>
<td></td>
<td><em>Did you follow the advice given?</em></td>
</tr>
<tr>
<td></td>
<td><em>Do you think you will continue to follow that advice? What information or advice had the most impact on your knee?</em></td>
</tr>
<tr>
<td></td>
<td>8. How did the physiotherapist teach you your exercise program – did you understand what to do?</td>
</tr>
<tr>
<td></td>
<td><em>Did you follow the exercise program as it was prescribed?</em></td>
</tr>
<tr>
<td></td>
<td><em>Do you think you will continue with the exercises/physical activity recommendations in the future?</em></td>
</tr>
<tr>
<td></td>
<td>9. How did you feel about the relationship you developed with the health professional(s) over the phone?</td>
</tr>
<tr>
<td></td>
<td><em>Do you think consulting via telephone had an impact on that relationship or not?</em></td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>10. Can you describe what has changed for you as a result of receiving care over the phone?</td>
</tr>
<tr>
<td></td>
<td><em>How did the advice and support affect your knee?</em></td>
</tr>
<tr>
<td></td>
<td><em>What effect did it have on your everyday life?</em></td>
</tr>
<tr>
<td></td>
<td>11. Based on your experiences, what do you think about using the phone for consultations with health professionals in the future for your knee OA?</td>
</tr>
<tr>
<td></td>
<td><em>Is there anything you would change about such a service, based on your experience in this study, if you could?</em></td>
</tr>
<tr>
<td><strong>Concluding remarks</strong></td>
<td>Do you have anything else to add?</td>
</tr>
</tbody>
</table>

Questions in italics were used as prompts if necessary.
Chapter 8. Patient perceptions of telephone-delivered exercise

Table 3. Participant characteristics (n = 20)

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Age (years)</th>
<th>Gender</th>
<th>BMI (kg/m²)</th>
<th>Geographical location</th>
<th>Knee pain severity</th>
<th>WOMAC score (pain)</th>
<th>WOMAC score (function)</th>
<th>Number of calls with physiotherapist</th>
<th>Employment status</th>
<th>Education level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rachel</td>
<td>58</td>
<td>Female</td>
<td>37.1</td>
<td>Metropolitan</td>
<td>5</td>
<td>8</td>
<td>19</td>
<td>7</td>
<td>Retired</td>
<td>Graduated from university or polytechnic</td>
</tr>
<tr>
<td>Jane</td>
<td>62</td>
<td>Female</td>
<td>25.8</td>
<td>Regional</td>
<td>6</td>
<td>6</td>
<td>19</td>
<td>5</td>
<td>Part-time</td>
<td>Some tertiary training</td>
</tr>
<tr>
<td>Monica</td>
<td>58</td>
<td>Female</td>
<td>24.0</td>
<td>Metropolitan</td>
<td>6</td>
<td>8</td>
<td>33</td>
<td>6</td>
<td>Retired</td>
<td>Some tertiary training</td>
</tr>
<tr>
<td>Kate</td>
<td>51</td>
<td>Female</td>
<td>33.6</td>
<td>Metropolitan</td>
<td>7</td>
<td>7</td>
<td>21</td>
<td>5</td>
<td>Full-time</td>
<td>Post-graduate study</td>
</tr>
<tr>
<td>Benita</td>
<td>59</td>
<td>Female</td>
<td>25.3</td>
<td>Metropolitan</td>
<td>7</td>
<td>10</td>
<td>40</td>
<td>9</td>
<td>Retired</td>
<td>Graduated from university or polytechnic</td>
</tr>
<tr>
<td>David</td>
<td>69</td>
<td>Male</td>
<td>29.0</td>
<td>Regional</td>
<td>4</td>
<td>6</td>
<td>24</td>
<td>9</td>
<td>Part-time</td>
<td>Post-graduate study</td>
</tr>
<tr>
<td>Hannah</td>
<td>47</td>
<td>Female</td>
<td>26.0</td>
<td>Regional</td>
<td>4</td>
<td>6</td>
<td>20</td>
<td>8</td>
<td>Part-time</td>
<td>Three years or more of high school</td>
</tr>
<tr>
<td>Greg</td>
<td>47</td>
<td>Male</td>
<td>27.2</td>
<td>Metropolitan</td>
<td>6</td>
<td>6</td>
<td>19</td>
<td>7</td>
<td>Full-time</td>
<td>Post-graduate study</td>
</tr>
<tr>
<td>Harry</td>
<td>49</td>
<td>Male</td>
<td>35.6</td>
<td>Metropolitan</td>
<td>8</td>
<td>9</td>
<td>21</td>
<td>6</td>
<td>Full-time</td>
<td>Three years or more of high school</td>
</tr>
<tr>
<td>Neil</td>
<td>56</td>
<td>Male</td>
<td>28.7</td>
<td>Regional</td>
<td>4</td>
<td>5</td>
<td>22</td>
<td>8</td>
<td>Full-time</td>
<td>Some tertiary training</td>
</tr>
<tr>
<td>Camilla</td>
<td>66</td>
<td>Female</td>
<td>55.2</td>
<td>Metropolitan</td>
<td>8</td>
<td>13</td>
<td>49</td>
<td>7</td>
<td>Retired</td>
<td>Three years or more of high school</td>
</tr>
<tr>
<td>Patricia</td>
<td>64</td>
<td>Female</td>
<td>21.8</td>
<td>Regional</td>
<td>4</td>
<td>5</td>
<td>20</td>
<td>5</td>
<td>Retired</td>
<td>Graduated from university or polytechnic</td>
</tr>
<tr>
<td>Sally</td>
<td>54</td>
<td>Male</td>
<td>37.9</td>
<td>Regional</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td>6</td>
<td>Full-time</td>
<td>Three years or more of high school</td>
</tr>
<tr>
<td>Valerie</td>
<td>67</td>
<td>Female</td>
<td>19.1</td>
<td>Metropolitan</td>
<td>5</td>
<td>7</td>
<td>21</td>
<td>6</td>
<td>Retired</td>
<td>Less than three years of high school</td>
</tr>
<tr>
<td>Tiffany</td>
<td>64</td>
<td>Female</td>
<td>37.7</td>
<td>Regional</td>
<td>10</td>
<td>10</td>
<td>40</td>
<td>6</td>
<td>Part-time</td>
<td>Some tertiary training</td>
</tr>
<tr>
<td>Ross</td>
<td>79</td>
<td>Male</td>
<td>33.2</td>
<td>Metropolitan</td>
<td>8</td>
<td>9</td>
<td>22</td>
<td>5</td>
<td>Retired</td>
<td>Some tertiary training</td>
</tr>
<tr>
<td>Anthony</td>
<td>56</td>
<td>Male</td>
<td>27.5</td>
<td>Metropolitan</td>
<td>7</td>
<td>7</td>
<td>21</td>
<td>10</td>
<td>Full-time</td>
<td>Post-graduate study</td>
</tr>
<tr>
<td>Elizabeth</td>
<td>47</td>
<td>Female</td>
<td>26.4</td>
<td>Metropolitan</td>
<td>7</td>
<td>7</td>
<td>23</td>
<td>9</td>
<td>Full-time</td>
<td>Graduated from university or polytechnic</td>
</tr>
<tr>
<td>Phoebe</td>
<td>51</td>
<td>Female</td>
<td>26.7</td>
<td>Regional</td>
<td>6</td>
<td>10</td>
<td>26</td>
<td>10</td>
<td>Part-time</td>
<td>Graduated from university or polytechnic</td>
</tr>
<tr>
<td>James</td>
<td>71</td>
<td>Male</td>
<td>21.0</td>
<td>Metropolitan</td>
<td>5</td>
<td>5</td>
<td>13</td>
<td>6</td>
<td>Retired</td>
<td>Graduated from university or polytechnic</td>
</tr>
</tbody>
</table>

aMetropolitan and regional classification, based on residential postcode, in accordance with Australian Standard Geographical Classification
bMeasured by 11-point numeric rating scale (0 = no pain, 10 = worst pain possible) prior to randomisation for the trial

BMI: body mass index; SD: standard deviation
Table 4. Themes, sub-themes and exemplary quotes relating to the structure of telephone-delivered exercise therapy by physiotherapists

<table>
<thead>
<tr>
<th>Theme: Positive experiences using the telephone</th>
<th>Exemplary quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sceptical at first</td>
<td>Rachel “I was really sceptical about that at first... I was sort of like ‘oh you know I just don’t know how this will work’. But it worked really well.”</td>
</tr>
<tr>
<td></td>
<td>Kate “I was a bit sceptical at first... because I thought, ‘How can that work, you have to go and see a physio.’ So I was a little bit dubious, I suppose, but once I’d spoken to the physio and spoken to the nurse the first time, I thought, ‘Well, actually, that’s quite beneficial, I can see how that’s going to work.’”</td>
</tr>
<tr>
<td></td>
<td>Tiffany “I sort of didn’t believe that it’d work over the phone and I was quite surprised how well it did work.”</td>
</tr>
<tr>
<td>Embracing telephone-delivery</td>
<td>Hannah “You know what? I found it just as good if not better... I think [the physiotherapist] had excellent visual skills so what I was explaining, yeah she sort of could give me very good feedback as if she was in the room so I really didn’t see a difference [to face-to-face].”</td>
</tr>
<tr>
<td></td>
<td>Sally “It was just as good as going to see a physio. I think if I had an injury, yes, you need to see the physio for that. But for the aim of where it was which was reducing your pain level and stuff like that I think all I needed over the phone was perfect for that.”</td>
</tr>
<tr>
<td></td>
<td>David “It’s really important in places like Tasmania, which doesn’t always have access to face to face stuff, and if that were the only alternative I’d be only too happy to do it. Because it does work.”</td>
</tr>
<tr>
<td></td>
<td>Greg “It was a totally great experience for me as in there is nothing – no there’s nothing that I can really think of that was difficult or anything.”</td>
</tr>
<tr>
<td></td>
<td>Phoebe “If you can talk about different problems you’re having, and that sort of thing, it’s much better. It’s better than going all the way to the physio and waiting in the waiting room”</td>
</tr>
<tr>
<td>Conveniently</td>
<td>Benita “It was pretty easy to talk on the phone. You’ve got that anonymity on the phone. So you probably feel free to just chat about things.”</td>
</tr>
<tr>
<td></td>
<td>Hannah “It put it in location... I was in my own home... So there and then while you’ve got [the physio] on the phone you’re actually physically going and walking around your own home where you are going to be doing the exercises anyway.”</td>
</tr>
<tr>
<td></td>
<td>Camilla “I think it was sort of like you’re inviting someone in - not into your home but you’re inviting someone in to talk to you. I had strong commitment to actually do things... I was more committed.”</td>
</tr>
<tr>
<td></td>
<td>Elizabeth “The fact that in a way not being face-to-face can sometimes be a positive when you’re talking about difficulties. So, it can be a little bit easier to do it that way.”</td>
</tr>
<tr>
<td>Convenience</td>
<td>Greg “It was efficient; obviously I didn’t have to get in the car and go and get the treatment plan, it could all be done over the phone. So it was sort of cost cutting, time saving.”</td>
</tr>
<tr>
<td></td>
<td>Camilla “The convenience of over the phone, it was like, oh I’m in my home, I can whack on a tracksuit or a pair of trousers and something comfortable and just answer the phone. So the convenience wise it was great.”</td>
</tr>
<tr>
<td></td>
<td>Hannah “Because life’s so busy in general too, so to be able to speak to somebody in your home and then you can go on with your, you know, your next thing, is just wonderful... it just opens another brilliant option for people.”</td>
</tr>
</tbody>
</table>
Chapter 8. Patient perceptions of telephone-delivered exercise

<table>
<thead>
<tr>
<th>Theme: Desire for visual contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harry “If given the choice between going to an appointment and then doing it over the phone, I’d probably prefer to see a physio, basically because they can see what’s wrong and not relying on my description of what’s wrong.”</td>
</tr>
<tr>
<td>Benita “When you do it with a physio who’s looking at you and they can see what you’re doing, they can see if your technique’s not quite right and they can correct it… But when you’re doing it on your own, you can do it incorrectly I think… they don’t know much about you on the phone, whether you’re tall or short or big or fat or…” You know what I mean?”</td>
</tr>
<tr>
<td>Anthony “If I was face-to-face with the physio, they can see what’s really affecting me and you can’t pick that on the phone, unless we did it – we Skyped or something like that… that’s maybe the next step”</td>
</tr>
<tr>
<td>Phoebe “If you were unsure on how to do something – because they can’t show you how to do something… for someone that’s very unsure about those sort of things, that might be a bit difficult. They may need to be shown the exercises… Maybe one face-to-face and then on it’s just phone calls; I don’t know. It worked well, with just what we were doing”</td>
</tr>
<tr>
<td>James “I would like the first couple to be face to face and then maybe follow-ups for the next few over the phone and then maybe a check-up somewhere down the track face to face. Somebody could see right when you were here first time this is what it looked like, now it looks like this in my opinion as an expert there’s a definite improvement. To me that’d be value for money if somebody told me that face to face”</td>
</tr>
<tr>
<td>Theme: Dedicated care</td>
</tr>
<tr>
<td>------------------------------</td>
</tr>
<tr>
<td>Personalised advice</td>
</tr>
<tr>
<td>Ongoing support</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Theme: Effective communication</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective communication</td>
<td>Monica “It was that consistency…motivating me along a little bit to keep up the exercises that we talked about in each session and I knew I was going to talk to someone again in a few weeks on how I was progressing.”</td>
</tr>
<tr>
<td>Ongoing support</td>
<td>Kate “It was good just to speak to someone who could give me extra advice and provide me with exercises I could follow, and then follow up on how I was going on a regular basis. So I found that really beneficial.”</td>
</tr>
<tr>
<td>Ongoing support</td>
<td>Greg “It was an effective treatment for me to have somebody monitoring and somebody a little bit like a personal trainer I guess.”</td>
</tr>
<tr>
<td></td>
<td>Anthony “What stands out the most for me personally, it’s sort of…motivation and encouragement for me to do things that I’m meant to be doing for my knees and hips”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Theme: Undivided focus and attention</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undivided focus and attention</td>
<td>Monica “She was a very, very good listener and she seemed to understand everything I was saying, and when she talked to me I understood what she was saying as well.”</td>
</tr>
<tr>
<td>Ongoing support</td>
<td>Harry “When I was talking to the physio, it was easy to understand what he was – the way he spoke to me and it was in basic terms and that sort of thing. He was quite good in getting his message across and getting the exercises working with the handouts and that sort of thing, it was quite easy to understand what he wanted you to do and how to do it, so there were no problems there from that perspective.”</td>
</tr>
<tr>
<td>Ongoing support</td>
<td>Phoebe “Often if you go [to the physio] for the knee pain, you don’t get listening to that often. Because [the telephone] is not a face-to-face thing, where they have to listen to what you’re saying. So, that was good. I felt that was really beneficial. I felt like you were being heard.”</td>
</tr>
<tr>
<td>Ongoing support</td>
<td>David “It was different from seeing a physio face-to-face. My experience with physios in the past is that they give some treatment and then they leave you alone for extended periods… Whereas this was concentrated attention for 15 to 20 minutes. So it was quite different. Quite different…we got down to talking about what was really important, and then agreed on actions.”</td>
</tr>
</tbody>
</table>
Chapter 8. Patient perceptions of telephone-delivered exercise

Tiffany “Even though it’s not face-to-face it’s a little bit more personal. Like as I say, when you go to a specialist or the doctor’s you only get that little time and they don’t have the time to spend with you”

Phoebe “I looked forward to [the physio] calls because we could discuss problems I’d had. You don’t even get that with a specialist or something like that; they’re not very good listeners. Well, [the physio] had to listen, because it’s the only way that he can get information. So, that was really good”

<table>
<thead>
<tr>
<th>Theme: Confidence performing exercise</th>
<th>Helpful resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tiffany “Even though it’s not face-to-face it’s a little bit more personal. Like as I say, when you go to a specialist or the doctor’s you only get that little time and they don’t have the time to spend with you”</td>
<td>Benita “Yeah it was pretty easy, they had photos, the booklet had photos so it was pretty easy to follow, yeah. And the exercises themselves were pretty easy… I wasn’t too concerned”</td>
</tr>
<tr>
<td>Phoebe “I looked forward to [the physio] calls because we could discuss problems I’d had. You don’t even get that with a specialist or something like that; they’re not very good listeners. Well, [the physio] had to listen, because it’s the only way that he can get information. So, that was really good”</td>
<td>Monica “I had my book in front of me so when we were talking about exercises we’d go to each exercise… I’d have the visual thing [photos] there as well. I think if I didn’t have that it would be harder. You’d need to have that as well.”</td>
</tr>
<tr>
<td>Valerie “[the physio] explained everything, you know, and she’d get me to do the exercises like while we were on the phone so I knew exactly what we were doing. And the information that initially came was fantastic; it was really comprehensive”</td>
<td>Sally “I don’t think it would have worked if we hadn’t received early the printed exercises. So we needed that reference manual. I don’t think you could do it without the reference manual because that gave you that visual of the exercises so you could see it… I think you needed both to go together rather than just hearing it over the phone.”</td>
</tr>
<tr>
<td>Incorporation into daily life</td>
<td>Kate “I found it easy to do because I could do it at school or at home. It was so easy to put into my day. It wasn’t any extra I had to worry about it. It was just, “Okay, I will just sit and do this,” or, “Washing the dishes, I can do these exercises.” …I found it was quite easy to implement.”</td>
</tr>
<tr>
<td>Rachel “The best part of all that I found was a lot the exercises that he gave me to do I could actually incorporate into things I was doing during the day… some of the exercises I’ve been doing while I was getting the dinner ready for example.”</td>
<td>Sally “I was watching the telly or something but that’s what she had given you exercises that you could do just while you’re standing up leaning on the kitchen bench with your legs and just strengthening and stuff like that. So you just sort of - it’s been built in now a little bit.”</td>
</tr>
</tbody>
</table>
Table 6. Themes, sub-themes and exemplary quotes related to the outcomes of telephone-delivered exercise therapy by physiotherapists

<table>
<thead>
<tr>
<th>Theme: Health benefits</th>
<th>Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle strength</td>
<td>Jane “I’m probably stronger in the leg but it doesn’t make the pain go away but has not increased, it’s definitely not worse.”</td>
</tr>
<tr>
<td></td>
<td>Monica “I think some of my muscle areas that we were working on are stronger than they were before I started. I’ve got no doubt in my mind.”</td>
</tr>
<tr>
<td></td>
<td>Sally “[I] can see better flexibility by continuing the exercises that she’s given me and strengthening that knee in particular.”</td>
</tr>
<tr>
<td></td>
<td>Phoebe “It definitely made it a stronger knee, or stronger muscles around the knee. I suppose, e.g. quad muscles and things like that. Therefore, I was able to move around a bit easier and stairs weren’t as bad”</td>
</tr>
<tr>
<td>Improved pain</td>
<td>Rachel “I’m not suffering the pain levels that I was suffering before.”</td>
</tr>
<tr>
<td></td>
<td>David “I’ve had a positive result with the knee pain, which is virtually gone.”</td>
</tr>
<tr>
<td></td>
<td>Greg “The hip exercise was one of the things that was most effective…It basically eliminated all pain I’ve ever had in my leg, it’s gone now, and I’ve had it for years.”</td>
</tr>
<tr>
<td></td>
<td>James “I was finding that I could do more of my everyday activity without worrying about the pain”</td>
</tr>
<tr>
<td>Breaking barriers</td>
<td>Jane “I ended up doing some exercises that I’ve mentally thought I couldn’t do and I can do… I thought oh, I don’t think I can do this but I could, it’s much stronger than I thought it was.”</td>
</tr>
<tr>
<td></td>
<td>Rachel “I’d been staring to walk everyday which I had never done before. Before I used to hop in the car and go up the street to get things at the shops.”</td>
</tr>
<tr>
<td></td>
<td>Patricia “I’m probably a bit more confident in sort of going back doing other things that I’ve sort of stopped doing.”</td>
</tr>
<tr>
<td></td>
<td>Sally “One thing that the physio probably did was boost my confidence, I think, to do exercises in the pool perhaps that I hadn’t wanted to try because it… my knee would lock or things like that.”</td>
</tr>
</tbody>
</table>
Chapter 9 “I was really pleasantly surprised”: experience shifts physiotherapists’ perceptions of telephone-delivered exercise therapy for knee osteoarthritis. A qualitative study.

This manuscript is currently under review at Arthritis Care & Research, Lawford BJ, Delany C, Bennell KL, Hinman RS. “I was really pleasantly surprised”: experience shifts physiotherapists’ perceptions of telephone-delivered exercise therapy for knee osteoarthritis. Submitted March 2018.

Author contribution for this chapter are the following: study conception and design (RSH, BJL, KLB, CD); data collection (BJL); data analysis (BJL, CD) and interpretation of data (all authors); drafting of the manuscript (BJL); critical revision of the manuscript (all authors). All authors approved the final version of the manuscript.

This study was funded by the National Health and Medical Research Council (Partnership Project #1112133 and Centre of Research Excellence (#1079078)) and the Medibank Better Health Foundation, with in-kind support from MOVE muscle, bone and joint health (formerly Arthritis & Osteoporosis Victoria), HealthChange Australia and the Australian Physiotherapy Association. RSH is supported by Australian Research Council Future Fellowship (FT130100175). BJL is supported by a PhD stipend from the National Health & Medical Research Council Centre of Research Excellence (#1079078). KLB is supported by a National Health & Medical Research Council Fellowship (#1058440).
“I was really pleasantly surprised”: experience shifts physiotherapists’ perceptions of telephone-delivered exercise therapy for knee osteoarthritis. A qualitative study.
Belinda J Lawford, Clare Delany, Kim L Bennell, Rana S Hinman

Abstract (249 words)

Objectives: To explore if the experience of delivering exercise therapy via telephone for people with knee osteoarthritis shifts physiotherapists’ perceptions about such services.

Methods: A qualitative study embedded within a large randomised controlled trial. All eight physiotherapists involved in the trial participated in semi-structured interviews before, and after, delivering exercise advice and support to people with knee osteoarthritis via telephone.

Results: Prior to delivering the intervention, physiotherapists felt that the telephone should only be used for follow-up, rather than the primary mode of providing care. They believed telephone-delivered care would be convenient and cost-saving for patients, would provide increased opportunity for patient education and also increase access to services, but that the lack of visual and physical contact with patients would be problematic. After delivering the intervention, physiotherapists reflected that telephone-delivered care exceeded their expectations, noting positive patient outcomes including improved pain, function, and confidence. The focus on communication allowed more personal conversations with patients and shifted patient expectations of care away from manual therapies and towards self-management. Numerous implementation considerations were identified, including the need for clinician training in communication skills, written resources for patients to supplement calls, and careful deliberation of how telephone calls could be scheduled amongst in-person consultations in clinical practice.
Conclusions: Although physiotherapists were initially sceptical about the effectiveness of telephone-delivered service models for knee osteoarthritis, perceptions shifted once they experienced delivering care via this non-traditional method. Findings suggest that first-hand experience may be necessary for physiotherapists to embrace new models of service delivery.

Significance and innovations:

- There is some evidence that physiotherapists do not agree that telephone-delivered exercise therapy for people with osteoarthritis is an acceptable, safe, or effective mode of service delivery.

- Prior to delivering care for people with knee OA over the telephone, physiotherapists believed that the telephone should only be used for follow-up with patients, and, although they thought it would be convenient and cost-saving for patients, they expressed concern about the lack of physical and visual contact.

- After delivering care for people with knee OA over the telephone, physiotherapists found that the lack of physical and visual contact was less of an issue than initially anticipated and were pleasantly surprised by the positive outcomes they were able to achieve with patients.

- Although physiotherapists may be initially sceptical of new models of service delivery like telephone-delivered care, our findings suggest that first-hand experience helps to shift perceptions and may help facilitate future implementation of novel service models.
9.1 Introduction

Knee osteoarthritis (OA) is prevalent, affecting approximately one quarter of adults [1]. Clinical guidelines recommend exercise as a core component of non-surgical management of OA irrespective of patient age, comorbidity, pain severity, or disability [2-5]. Therapeutic exercise, particularly muscle strengthening, is associated with improvements in pain, function, and quality of life amongst people with knee OA [6]. In addition, given that people with knee OA who are sedentary have poorer physical function [7, 8], advice to increase physical activity is also important.

Of all allied healthcare professionals, general practitioners most commonly refer their patients with OA to physiotherapists [9, 10]. Physiotherapy care is typically provided in-person in clinics, yet there is evidence that people experience difficulties accessing these services. For example, although people with OA believe that exercise therapy and physiotherapy care are important, a range of system barriers contribute to poor uptake (e.g. lack of service provision, inconvenient appointment times or venue location) [11, 12]. In addition, common barriers to exercise participation amongst people with OA include lack of access to facilities, conflict with routines, and transport difficulties [13].

Telerehabilitation, which is the remote provision of rehabilitation services via telecommunication technology [14], is one way in which the accessibility of services like physiotherapy could be improved. Providing care via telephone is a potentially accessible and inexpensive option, allowing patients to consult from their own home or workplace. In addition, the ‘hands-off’ nature of telerehabilitation consultations might help foster patient self-management skills [15]. There is emerging evidence that telephone-delivered care is effective and comparable to in-person practice for people with musculoskeletal conditions (e.g. OA and those who have undergone knee/hip arthroplasty) [16]. For
example, the UK physiotherapist-led telephone service ‘PhysioDirect’ has been shown to be as equally effective as usual care, and provides faster access to physiotherapy, for people with musculoskeletal conditions [17].

Although there is evidence that telerehabilitation is effective, successful implementation is dependent upon the perceived acceptability and usefulness of these services amongst patients and healthcare providers [18-20]. We recently conducted a survey and found that physiotherapists in Australia, most of whom had no prior experience with delivering telerehabilitation, did not agree that telephone-delivered care would be acceptable, effective, or useful for people with OA [21]. This is in contrast to people with knee and/or hip OA, who believed that telephone-delivered care would be safe, useful, acceptable, and would improve their OA symptoms [22]. However, as our data from physiotherapists was collected via an online survey, it is not clear why they held these perceptions, or whether their perceptions could be shifted with first-hand experience of delivering care via this non-traditional method. Thus, the aim of this study was to qualitatively explore whether physiotherapists’ perceptions about telephone-delivered exercise therapy for people with knee OA shift once they have delivered exercise management for people with knee OA over the telephone.

9.2 Methods

9.2.1 Design

This study used a longitudinal qualitative study design, nested within an ongoing randomized controlled trial (RCT, Australian New Zealand Clinical Trials Registry ANZCTR 12616000054415) evaluating the effectiveness of incorporating exercise advice and support by physiotherapists for adults with knee OA into an existing
Chapter 9. Physiotherapists’ perceptions of telephone-delivered exercise

Australian nurse-led national musculoskeletal telephone service [23]. The Consolidated Criteria for Reporting Qualitative Research checklist was used to ensure complete and transparent reporting of this qualitative study [24].

9.2.2 Participants

All eight physiotherapists who were employed to deliver the intervention for the RCT were invited, and participated, in this qualitative study. Physiotherapists were recruited from Victoria, Australia, through the research team’s clinical networks. Selection criteria included a physiotherapy qualification, at least two years musculoskeletal professional experience and current Australian registration to practice. All participants provided written informed consent and the institutional ethics committee approved the study.

9.2.3 Intervention

Details of the intervention have been described elsewhere [23]. Briefly, research participants with knee OA were randomly assigned to one of the eight physiotherapists and received between 5-10 telephone consultations over a six-month period. Physiotherapists devised goals and an action plan for each participant that involved both a structured home exercise program and physical activity plan. The program and goals were adjusted as necessary throughout the intervention. Physiotherapists aimed to provide support by increasing participant knowledge and understanding of knee OA and the benefits of exercise, and also worked to increase participants’ motivation and confidence in completing, and adhering to, an exercise program. Before the first consultation, each participant completed a pre-treatment questionnaire that provided information for the physiotherapists about clinical history, knee symptoms, physical limitations, and personal goals.
Each participant was provided with a detailed information folder, three resistance bands for home exercises, and access to a study website containing video demonstrations of each exercise. The information folder contained material about OA and its effective management, the role and benefits of physical activity, and strategies for fatigue management. Participants were also provided with exercise instructions and photos, a diary to record exercise adherence and knee symptoms, and a template of a self-management plan. Each physiotherapist was also provided with an identical information folder to refer to while speaking to participants. Physiotherapists used online treatment notes to record health literacy topics discussed, clinical history, personal motivators, prescribed exercises, action plan strategies, and ratings of participant confidence to carry out the action plan.

In the three months prior to the start of the intervention, physiotherapists underwent training in person-centred practice and behaviour change support using HealthChange® Methodology (http://www.healthchange.com/). This involved an initial two-day training workshop, a period of practice consultations over three months, and a final training day. Briefly, the methodology involves: i) a set of practice principles to guide effective communication and knowledge transfer; ii) a set of techniques used to identify and address barriers to behaviour change, and; iii) a 10-step decision framework that acts as a health behaviour change clinical pathway to guide decision-making. To assist physiotherapists to use these skills throughout the intervention, a structured consultation framework (part of the HealthChange® Methodology) was embedded within the online treatment notes. The training program, and its impacts on the physiotherapists, have been described in detail elsewhere [25].
9.2.4 Interviews

Two semi-structured interviews with each physiotherapist were conducted: i) in the week prior to the training program and; ii) after participant recruitment for the trial was complete and the physiotherapist had completed all consultations with 75% of their allocated participants. The pre-intervention interview guide (Table 1) ascertained physiotherapist beliefs about the likely effectiveness of delivering exercise therapy via telephone, and their expectations about delivering the intervention. The post-intervention interview guide drew from the Donabedian Framework [26] (Table 1), which is used for quality assessment in healthcare and advocated as a useful model for reviewing physiotherapy services [27]. The framework considers three elements of healthcare quality: i) structure (environment where the service is provided); ii) process (clinician and patient activities involved in delivering/receiving care including the clinician-patient relationship), and; iii) outcome (effects of the care provided).

All interviews were conducted over the telephone by the same investigator (BJL), a graduate research student who was trained in qualitative methodologies, is not a clinician and had no other interactions with the physiotherapists. Interviews were audio recorded, and externally transcribed verbatim. Pseudonyms were assigned to each participant for confidentiality purposes. All data were de-identified and stored in digital format on a password-protected university server.
<table>
<thead>
<tr>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tell me what you think about telephone-delivered physiotherapy care.</td>
<td>1. What stands out most about your experience of being a physiotherapist delivering care in the trial?</td>
</tr>
<tr>
<td>How do you think telephone-delivered care fits into physiotherapy practice (not just for OA)?</td>
<td>2. During our first interview before the trial started, I asked you about your expectations of the study. Overall, do you think your experiences matched those expectations?</td>
</tr>
<tr>
<td>2. Can you tell me about why you wanted to be involved in this study?</td>
<td>How did it meet/not meet your expectations?</td>
</tr>
<tr>
<td>3. Telerehabilitation is defined as the delivery of rehabilitation services over telecommunication technology. Do you have any experience with telerehabilitation? Tell me about that. Did you like it? What were the outcomes for you/the patient?</td>
<td>Was there anything that took you by surprise, that you weren’t expecting?</td>
</tr>
<tr>
<td>4. Can you tell me what you think telephone-based physiotherapy services could offer people with knee OA? How might it help people with OA? Do you see any advantages it could have over face-to-face physiotherapy?</td>
<td>3. What stood out to you as the best things about delivering care over the phone? Did you think there were any clear advantages of delivering care via phone? Were there things you liked about it?</td>
</tr>
<tr>
<td>5. How do you think providing physiotherapy exercise advice and support over the telephone will compare to the way you usually treat a patient with knee OA in the clinic when you consult with them face-to-face? In what ways will it be different? How will it be similar?</td>
<td>4. Was there anything challenging about delivering care over the phone? Was there anything you didn’t like about providing care via phone? Did you have any difficulties at any time? Can you remember a particular conversation/treatment that went well or not so well? and why it went well/not so well</td>
</tr>
<tr>
<td>6. I’m interested in your ideas about how you might gain an understanding of the patient and their knee condition over the phone. Tell me about that. Is there anything that you think you would like to do but might not be able to?</td>
<td>5. How do you think it compares to consulting with patients face-to-face in your rooms? How/why was it different/the same or better/worse? If required-Reflect specifically on patients with knee OA.</td>
</tr>
<tr>
<td>7. Tell me a bit about how you normally prescribe exercise to a patient in the clinic, and how you think prescribing exercise over the telephone will be different? How will you teach the patients their exercise programs over the phone? What do you expect will be easy/difficult?</td>
<td>6. How did the calls fit into the structure of your working day? Did you make the calls in your usual working hours? Did you make the calls from your usual workplace or elsewhere? How did you feel about these locations? Which locations were easier/more difficult?</td>
</tr>
<tr>
<td>8. Tell me a little bit about your typical communication style and the methods you use to build a relationship with your patients.</td>
<td>7. Tell me how about you assessed each patient… How did you feel about the depth of understanding you gained of each patient’s problem? How did this differ from face-to-face practice? Anything you couldn’t do that you wanted to? How did being unable to touch or see the patient influence your assessment? Did you refer to the pre-treatment survey/information that the patient provided? Was it useful?</td>
</tr>
<tr>
<td>9. What sort of relationship do you think you will develop with the patient over the telephone in the</td>
<td>8. Tell me about your experiences prescribing a structured exercise program and general physical activity plan over the phone. How did you instruct/teach the patients their exercise programs? What was easy and what was difficult? Did you do anything different compared to what you would normally do face to face?</td>
</tr>
</tbody>
</table>
9. Telecare trial, knowing that you won’t see your patients face to face?
   *How will the telephone influence your normal communication style?*
   *How will you pick up on non-verbal cues?*

10. Tell me about what impact you think the Telecare intervention will have on people with knee OA?

11. How confident are you feeling about delivering exercise counselling and advice to people with knee OA over the phone?
   *Do you hope to learn anything yourself from this trial?*

Do you have anything else you would like to add about your expectations of being involved in the Telecare trial?

9.2.5  **Data analysis**

Data analysis was based on a thematic approach [28]. Interview transcripts were read through by BJL after transcription, and then re-read to identify topics and concepts within the data. Similar or related topics were organised into categories and combined to form themes. Categories for post-intervention data were organised under each of the three elements of the Donabedian Framework (i.e. process, structure, and outcome) [26]. Categories and themes were separately reviewed and revised by both BJL and a qualitative expert (CD, who had no contact with the physiotherapists at any stage of the research). Overall themes were divided into sub-themes, which were reviewed and
discussed with all members of the research team [29]. To ensure credibility and confirmability of the data, another researcher (RSH) read all transcripts prior to discussion of the themes/sub-themes that were developed by BJL and CD. All analytical steps were done using standard word processing rather than qualitative analysis software.

9.3 Results

9.3.1 Participants

The cohort (Table 2) comprised an equal number of male and female physiotherapists, mostly working exclusively in private practice (63%) with an average (SD) of 14 (8) years of clinical experience. At the time of interview, physiotherapists had consulted with a mean (SD) of 9 (1) participants during the study, completing an average of 64 (22) telephone consultations.

Table 2. Physiotherapist characteristics (n = 8)

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Gender</th>
<th>Work setting</th>
<th>Clinical experience (years)</th>
<th>Previous experiences delivering telerehabilitation</th>
<th>Number of patients and telephone consultations completed*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karen</td>
<td>Female</td>
<td>Private and public</td>
<td>20</td>
<td>Yes (via Skype)</td>
<td>10 patients; 92 calls</td>
</tr>
<tr>
<td>Luke</td>
<td>Male</td>
<td>Private</td>
<td>4</td>
<td>No</td>
<td>9 patients; 61 calls</td>
</tr>
<tr>
<td>Simon</td>
<td>Male</td>
<td>Private</td>
<td>15</td>
<td>No</td>
<td>7 patients; 42 calls</td>
</tr>
<tr>
<td>Jane</td>
<td>Female</td>
<td>Private</td>
<td>7</td>
<td>No</td>
<td>10 patients; 83 calls</td>
</tr>
<tr>
<td>Maria</td>
<td>Female</td>
<td>Public</td>
<td>28</td>
<td>No</td>
<td>10 patients; 81 calls</td>
</tr>
<tr>
<td>Emma</td>
<td>Female</td>
<td>Private and public</td>
<td>14</td>
<td>No</td>
<td>8 patients; 27 calls</td>
</tr>
<tr>
<td>Gavin</td>
<td>Male</td>
<td>Private</td>
<td>5</td>
<td>Yes (via Skype)</td>
<td>9 patients; 74 calls</td>
</tr>
<tr>
<td>Ian</td>
<td>Male</td>
<td>Private</td>
<td>17</td>
<td>No</td>
<td>8 patients; 52 calls</td>
</tr>
<tr>
<td><strong>Mean (SD)</strong></td>
<td></td>
<td></td>
<td><strong>14 (8)</strong></td>
<td></td>
<td><strong>9 (1) patients; 64 (22) calls</strong></td>
</tr>
</tbody>
</table>

SD: standard deviation
*At the time of interview
9.3.2 Pre-intervention perceptions of telephone-delivered care (Table 3)

Five themes arose at the pre-intervention stage. These were:

Telephone is only for follow-up: Most physiotherapists tended to only use the telephone in their clinical practice to check-in on their patients and follow-up after an in-person consultation. The telephone was not viewed as a primary mode of providing care.

Patient convenience and cost-savings: Physiotherapists believed that telephone-delivered care would be convenient for patients, and that allowing patients to consult from their own home could make patients feel more comfortable talking about their condition and/or engaging in an exercise program. Some also thought telephone-delivered care could reduce patient costs associated with accessing physiotherapy services.

New opportunities: Physiotherapists believed that telephone-delivered care could provide increased opportunities to educate patients about OA. In addition, they felt that telephone-delivered care could allow a wider variety of people to access physiotherapy, such as those in remote areas or who would otherwise find it difficult to attend clinics in-person.

Unable to see or touch patients: Physiotherapists were concerned about being unable to see or touch patients when consulting via telephone. They believed that this could make assessment of patients difficult, due to inability to observe exercise technique or quality of movement. Physiotherapists thought that relationships with patients might be adversely impacted and it could be difficult developing rapport. They also believed they might experience difficulties communicating, particularly if the patient was unable to clearly describe their condition or movement difficulties. Physiotherapists felt the lack of visual
and physical contact would limit the strategies available to them when teaching patients an exercise program.

*Improved communication skills needed:* Compared to traditional in-person consultations, physiotherapists believed that they would need more effective communication skills to consult via telephone, including clear questioning and careful listening by both themselves and the patient. To supplement this, physiotherapists believed that it would be necessary to provide patients with pictures or videos of each exercise so that patients could gain an adequate understanding of exercise technique.

**Table 3. Pre-intervention themes, sub-themes, and exemplary quotes relating to physiotherapists’ expectations about delivering exercise therapy via telephone.**

<table>
<thead>
<tr>
<th>Theme: Telephone is only for follow-up</th>
<th>Example Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check-in on patients</td>
<td>“I guess it’s usual in practice that you end up having phone calls with some of your patients – often when things aren’t going so well or they want to call you to check with something” (Karen)</td>
</tr>
<tr>
<td></td>
<td>“telephone care the way I see it is probably more of a follow-up call after you’ve seen someone” (Luke)</td>
</tr>
<tr>
<td></td>
<td>“I think a lot of follow-up stuff could be done over the phone – checking in terms of checking how people are complying with exercise programs and monitoring whether they’re having flare ups and things” (Emma)</td>
</tr>
<tr>
<td>Not primary mode of providing care</td>
<td>“all of my experiences in physio have been in-person – home visits in the clinic. You certainly do liaise with people over the phone, but not really any - I don’t think telephone-based consultations has been widely used at the moment as a way of treating people” (Jane)</td>
</tr>
<tr>
<td></td>
<td>“with my work at the [hospital] I probably do call some patients... but it’s not sort of – it’s more about follow-up” (Maria)</td>
</tr>
<tr>
<td></td>
<td>“you would see someone face-to-face and then you may ring them three days later and just go ‘look, how are you going? How’s that exercise going?’ and potentially change or modify things according to – based on how they’ve gone. So I suppose form that point of view I do use it, but I don’t use it as a primary source of care” (Luke)</td>
</tr>
</tbody>
</table>

- **Theme: Patient convenience and cost-savings**

Karen “I guess cost, time, no travel obviously, convenience I think is a big thing I think people find it really difficult to schedule appointments … People find it really difficult to fit in their jobs, they’ve got family responsibilities, those kinds of things, whereas a phone call you can basically do anywhere – I think that’s convenient, it would be a big help.”

Emma “I think certainly for people who are working or are busy and they can’t get to a clinic, I think that’s often a limiting factor for some people attending the physio and this can make it more convenient and fit into what works for their lifestyle I think there’ll be a lot better compliance and a lot better engagement.”
Gavin “it’s a lot easier to set up a phone call because they don’t have to travel, they don’t have to worry about those sorts of things. Certainly more pertinent for those in a sort of more rural environment, but even those in a suburb environment that may not necessarily have local access to the right sort of facilities or services and that sort of thing as well.”

Karen “I think cost is a big issue with physio, particularly when you want to see someone over a bigger period of time … I think potentially having a reduced cost with phone-based physio presumably might be more cost-effective and might give an opportunity for a bigger chunk of input to get people you know at a higher functional level.”

Luke “potentially some physio clinics might go ok so we’ll offer it at a cheaper rate because well you know there’s no overheads there’s no equipment, there’s no administration stuff that I’m paying, I’m literally just jumping on a call and I can make that call potentially after hours or when it’s suitable for me as well”

Jane “I think also people are often a little bit more comfortable in their own home, so they might be more willing to participate with home-based exercises than some people. I know some people don’t like getting out and coming in to clinics.”

Maria “I’m thinking that maybe the contact would be more regular, and once again at a time and place that’s more convenient for the patient, so they’re sort of in the mindset that this is what they’re there to do at that point in time”

<table>
<thead>
<tr>
<th>Theme: New opportunities</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced cost for patients</td>
<td>Karen “[telephone-delivered care] offers them an opportunity to ask questions, I think when people have got chronic diseases or knee OA, people often really want some clarity about – particularly related to exercise – but also related to what’s reasonable related to symptoms and I think [phone-delivered care] would give them structure”</td>
<td></td>
</tr>
<tr>
<td>Patient comfort</td>
<td>Emma “I think [telephone-delivered care is] possibly a big way of the future. I think a lot of what I guess current research into back pain at least shows that advice is one of the most powerful things you can give the patient, and obviously in terms of patients being busy and time poor, being able to do that over the phone at times that suit them… I think there’s a big market for it.”</td>
<td></td>
</tr>
<tr>
<td>Access</td>
<td>Jane “I think that we’d be able to access clients – or different clients, so people that have difficulty accessing the community, difficulty with transport, non-ambulant. I think a lot of people who struggle with appointments – we’d be able to reach a wider variety of the population”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emma “[over the phone] you’re not limited by where people live, so if people are living more remotely you can still provide them with good treatment over the phone. And areas where they might not have access to physio, that’s a bit advantage. And I guess people with children and people who just can’t get to the physio. It opens up a whole new market.”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maria “it’s something that could be done relatively easily from the clinician’s point of view, you know in terms of accessing patients, and it would also meant that perhaps patients who find it a bit difficult to get to appointments that you could regularly contact – have regular contact with these patients…it’s got the potential to play quite a significant role in supporting these patients in their sort of self-management of osteoarthritis”</td>
<td></td>
</tr>
<tr>
<td>Theme: Unable to see or touch patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>
| **Difficult to assess patients** | Karen “I think that physios do a lot of observation, I feel like that’s a normal thing to do when you’re assessing someone obviously, but also looking at their treatment and their quality of movement and those sorts of things. So they’re the things I feel a little bit less clear about – how that fits in [to telephone-delivered care].”
| | Luke “I think that [telephone-delivered care] really I suppose takes out the power of our observation skills…just trying to get an understanding of what the patient capabilities are over the phone, because obviously I can’t see them, so you know are we going to give them something that’s far too hard or far too easy, you probably won’t be able to regress or progress quickly, and then what’s the quality of that movement pattern like…you know all the things that we’ve got that we take for granted face-to-face might be a little bit of a challenge”
| | Maria “in terms of just the objective assessments we’re going to have to rely on what that patient is telling us… obviously it’s not quite the same as actually eyeballing someone and, you know, possibly putting your hand on someone or watching what they’re doing or, you know, watching how well they move… I think just getting used to having no eye contact for me personally might be a bit of a hurdle”
| **Relationships and rapport will suffer** | Karen “I think also there may be issues with the relationship you build… I can see on the phone that you don’t know what someone looks like, they don’t know – they’re only working off how you express yourself verbally”
| | Gavin “…it’s going to be hard to develop that sort of close relationship I suppose, because when we’re so used to meeting people and visualizing them and seeing them and having sort of a face to a name and that sort of thing as well, and sort of things we’ll traditionally do as far as meeting people is concerned, and that’s a tricky bridge”
| | Ian “I think [a strong relationship] comes down to being able to see that person face-to-face, so again we’ll lose that in a phone call… [it] will feel distant, I think it will feel very removed, and maybe a bit colder to start with, because you can’t use other cues or body language to express yourself”
| **Difficulties communicating** | Karen “I guess you’re just relying on the patient to give you clear information, and if they don’t have very good - some people just aren’t very clear communicators or they don’t have very good body awareness, and I think there could be issues with some patients”
| | Jane “I think the disadvantage is a little bit in the assessment, where without being able to see and touch and feel as a physio we rely on that information we get from the client a lot more. Which in some cases might be a disadvantage if they’re not very good at self-reporting or not very aware at understanding questions you’re asking.”
| | Ian “I think it will be different, and I think there’ll be a lot more explanation needed over the phone and clarification about what we’re trying to get that person to do… So yeah we’re going to have to rely a lot on good communication skills I think, on both parties.”
| **Limits ways to teach exercise** | Karen “I guess you can’t demonstrate, and you can’t observe the patient doing it, and you can’t touch them to ask them to move in a different way – all the feedback is going to have to be verbal, and they’re going to have to tell you whether they think they’re doing it in the way that you want them to… So I guess you’ve just got limited – more limited options, in terms of how you would go about prescribing exercise.”
| | Luke “In terms of exercise delivery and getting the specific exercises I think, from my point of view, that might be a little bit of a challenge because of how physios are all about getting exercise quite detailed and specific to our patient, when that’s over the phone that might be a bit of a challenge” |
Chapter 9. Physiotherapists’ perceptions of telephone-delivered exercise

Emma “I guess with some exercises, a demonstration often helps, or taking the patient through the actual exercise and showing them how to do it. … I guess describing exercises over the phone will be a skill I’ll have to learn as well.”

**Theme: Improved communication skills needed**

<table>
<thead>
<tr>
<th>Skill</th>
<th>Participant Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear questioning</td>
<td>Maria “I guess you sort of just would have to develop a particular way of asking questions and, you know, questioning further if necessary to get the sort of information that you need”</td>
</tr>
<tr>
<td></td>
<td>Karen “I can only assume that you need to compensate for the fact that you can’t smile, nod and give them eye contact by being a better verbal communicator or there must be ways that you can show that you’re an active listener and they’ve got your attention, verbally that’s just going to have to be a stronger component of what you say”</td>
</tr>
<tr>
<td></td>
<td>Jane “Asking them lots of questions about what makes them worse, what makes them feel a bit better, can they do – get them to do some things while they’re on the phone with you – get up and down from the chair, get them to do some functional activities while they’re on the phone. …I guess some of the things that we would normally want to do from an assessment side of things we just have to ask them to do it.”</td>
</tr>
<tr>
<td>Careful listening</td>
<td>Simon “I think we take a lot of cues from facial expression, body position, all those sorts of things I think that’s certainly something that’s going to be, picking up all those sorts of things and tone of voice and those sorts of things may be slightly more difficult to sort of make sure you are hitting the mark”</td>
</tr>
<tr>
<td></td>
<td>Emma “I guess you’ve just got to be keen to the tone of their voice and how they’re responding to questions.”</td>
</tr>
<tr>
<td></td>
<td>Gavin “You can listen for obviously some cues, with pauses and their language and – it’s not something that I’ve had any training with but you tend to pick up a couple of things along the way and if they’re emotive about what they’re talking about it will often come up across with their tone or their rate of talk”</td>
</tr>
<tr>
<td>Providing pictures or videos of exercises*</td>
<td>Karen “I think with the right type of extra audiovisual pictures or other material that I can still see that it should be relatively straight-forward to talk someone through something”</td>
</tr>
<tr>
<td></td>
<td>Luke “even maybe you know a booklet of exercise is really good but maybe even a – I’m just thinking – some kind of visual sort of DVD or something of actually forming the exercises through range and then actually potentially someone talking verbally how you do the exercise”</td>
</tr>
<tr>
<td></td>
<td>Jane “that would be ideal – if they’ve already got some resources with some pictures, so they know those details, for example if they’ve got something at home with an exercise quads over fulcrum, then I can get them to refer to the diagram, the equipment that they either do or don’t have, and then just talk them through the set-up, as to how it works.”</td>
</tr>
</tbody>
</table>

*At the time of interviewing, physiotherapists were not aware that participants would be provided with images of each exercise as well as access to exercise videos

**9.3.3 Post-intervention perceptions of telephone-delivered care (Table 4)**

Four themes arose post-intervention. These were:

**Exceeded expectations:** Physiotherapists found that their experiences delivering telephone-delivered care exceeded their expectations, resulting in new enthusiasm for this service delivery model. The lack of physical and visual contact was “less of an issue”
than anticipated. Physiotherapists were also surprised to discover that they developed a strong rapport with patients over the telephone and that patient adherence to their exercise program was high.

*Focus on communication:* Physiotherapists acknowledged that consulting via telephone forced them to focus on effective conversations with their patients. This allowed them to talk at a more personal level with patients, compared to in-person in their usual clinical setting. Consulting via the telephone, with its inherent focus on communication, caused a noticeable shift in patients’ expectations of physiotherapy care, in that they did not expect to receive “hands-on” therapy and seemed more willing to self-manage their condition.

*Positive outcomes:* Some physiotherapists were surprised by how effective the intervention was for their patients. In particular, physiotherapists noticed improvements in patient’s pain and function, and increased confidence to self-manage. Physiotherapists found that telephone-delivered care was convenient for their patients, as they did not have to travel to clinics in-person and could easily fit the consultations into their lifestyle.

*Implementation considerations:* Physiotherapists believed that, in some circumstances, it would have been helpful for them to see the patient’s knee or observe the patient walking in order to get a better understanding of their condition, and to observe their exercise technique. However, physiotherapists found that they were able to work around the lack of visual contact, often by “erring on the side of caution”. They valued the written materials that were provided to patients, including exercise instructions, pictures and video links, which helped them to prescribe exercises effectively. Physiotherapists
acknowledged that there was a “safety net” in place with the trial, as each participant had been screened prior to receiving the telephone-delivered care. Physiotherapists expressed some difficulty scheduling telephone consultations amongst their usual day of face-to-face consultations, with most opting to perform calls on days that they were not working in the clinic, or after-hours. Physiotherapists believed that training in communication and/or health coaching is important to effectively deliver care over the telephone.

Table 4. Post-intervention themes, sub-themes, and exemplary quotes relating to physiotherapists’ experiences delivering exercise therapy via telephone

| Theme: Exceeded expectations | Emma “I guess I was really pleasantly surprised with how well the program worked with the patients that I had through. I thought there’d be more difficulty communicating just via phone and getting people to comply…it probably exceeded my expectations, to be honest.” |
|-------------------------------|Ian “Initially I thought [the lack of face-to-face contact] would be hard. I thought there’d be some more barriers to being able to achieve the physio service that we wanted. But I actually found it a lot easier than what I expected. And I think patients were also on board and willing” |
| Strong rapport                | Simon “I guess I was concerned that [exercise prescription] was going to be tricky, but it was probably really easy and clients seemed to be pretty comfortable with getting the exercises done. So the one challenge that I thought was going to be, that it really didn’t exist.” |
| Player compliance             | Emma “I was pleasantly surprised at how well rapport could be built just over the phone. And that you don’t really need that visual – I was surprised by that.” |
|                               | Karen “I don’t think you lose anything on an interpersonal relationship level which, in the past…that had been my biggest concern: you lost some connection you have with the participant. But I don’t think you’d lose anything – I think that you can gain someone’s trust and you can develop a good working relationship as a patient and therapist through the phone…I don’t know that it matters that they can’t see you.” |
|                               | Jane “I think the thing that surprised me the most was how much rapport you could build with people over the phone. I expected that to be not quite the same as the way you would build rapport with someone in person, but I felt like I was able to do that over the phone” |
|                               | Simon “They were a really easy and positive cohort to work with and seemed to all report really good changes really quickly, and certainly implemented all of the specific exercise stuff really easily into their lifestyle…probably compliance was really easy, rather than complex or difficult.” |
Luke “[Before the intervention] I would have had doubts about the impact that we could have made and if we could make changes and I was potentially questioning the compliance of our patients and things like that, but I think I have been overly surprised with it.”

Maria “I think it would be a fantastic program to roll out…it is a relatively easy and I would hope, cost effective way, of getting that information out to these people and assisting them to make significant changes to their lifestyle, positive changes.”

Emma “I think that it’s something we, as physios, should be doing. It’s so easy, it makes the physio so accessible to so many people and you realise that a lot of the time the most important treatment from a physio is actually that discussion and the talking through problems and the educating. If we can, as a profession, get on top of that I think the chronic disease – especially knee OA and back pain and things like that – there is such a scope to have such a huge impact with very little cost.”

Jane “I think it was very effective. I’d happily do that… I definitely think in those instances where the general course of treatment is exercise and advice, I think that would be perfectly effective over the phone.”

**Theme: Focus on communication**

<table>
<thead>
<tr>
<th>More personal conversations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emma “I was trying not to talk too much at the patient which is kind of what I do in clinics. Like, you get there and you have your thrall of – the lecture of “I’ll tell you what’s wrong with you.” And actually holding back and letting them talk a lot more [over the phone] has been quite powerful as well as a good lesson for me.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shifts patient expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria “You had the time to really investigate what was motivating them or what their main issues were. Whereas I guess if you were more face-to-face and doing more of a traditional role you would be more focussed on their range of movement and their strength…it is more about finding out more about them as a person and helping them to remain motivated to continue with the program. I think over the phone facilitated that to a certain degree”</td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Jane “You can really talk to them at a very personal level in terms of understanding who else is in the house; what have they got on their fridge as a reminder.”</td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Karen “You can really talk to them at a very personal level in terms of understanding who else is in the house; what have they got on their fridge as a reminder.”</td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Emma “It changes everyone’s expectations, especially for patients, when treatment is delivered over the phone…probably when I treat face-to-face I guess there’s the expectation that a physio has to treat. So you’ve got to get your hands on, you’ve got to touch and probably reinforce that whole disability illness behaviour. Whereas, on the phone…you’re straight into discussing [health] management and exercises and it just works so much better. It’s probably influenced how I’m treating in the clinic a lot more as well. I’m doing a lot more exercise coaching, really, as opposed to actual treatment.”</td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Jane “I think it did take away from that expectation of manual therapy. I know when people come into the clinic and they’re coming in for a similar issue…because you’re in the room with them quite often there is an expectation of manual therapy and being on the phone it just completely takes it out of the equation. You don’t have to quite justify why you’re not doing the manual therapy quite as much because it’s just not an option.”</td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Simon “These clients knew that they weren’t getting that manual therapy hands on…I think the client comes with a totally different understanding and expectation of that self-driven care, [that] they’re going to be involved in doing things themselves to improve their condition”</td>
</tr>
</tbody>
</table>
### Theme: Positive patient outcomes

| Improved pain and function | Emma “Definitely increased functional capacity. A lot of them – nearly all of them – couldn’t walk far, couldn’t do stairs, couldn’t walk up hills. And the majority by the end of it, were doing that…functional improvements probably more so than pain, but learning to function better with the pain.” Jane “I find with a lot of the people I saw, I feel like we had some great effectiveness. The best part is I feel like I was effective and that I’ve been able to help the majority of people have been dealing with…A lot of them have returned to things they haven’t been able to do for a very long time.” Simon “Certainly a feeling of trust and strength in their knee. They seemed to all report that there was a definitely strength change…So good functional outcomes. Probably the majority of them also certainly reported improvements in pain within that six to 10 week timeframe” |  |
| Confidence | Maria “I am thinking of a couple of clients who it seems to have made a huge difference to their lives. For example, one client, she was in tears the first time I spoke to her and was so terrified about her knee pain and then by the end of it she was very much a different person, was really happy, was really positive and felt quite capable to continuing and working on the exercises and found great benefit from that” Jane “The biggest difference is a lot of them have a lot more confidence that they went into the program with the attitude of, “I’m going to have surgery,” and at the end, “I might be able to do this.” I think that was the biggest difference and got that with pretty much everybody; that they do feel confident that they will be able to self-manage if they do the right thing.” Luke “I think that people even were prepared to take on joining a gym. A couple of patients joined hydrotherapy linked with exercise physiologists. So I think just instilling that confidence and to be honest, when people were noticing improvements and I think it’s easier to join more of those activities or gyms and things like that because people are seeing improvement” |  |
| Convenience | Gavin “obviously the flexibility for the participant and the fact that, you know, obviously they don’t have to be at a location at any particular time…And for the most participants they sort of just were in the comfort of their own home, and that’s certainly a perk.” Ian “The best things are the flexibility with appointment times, so you can access people at various times of the day, and I guess it becomes a little bit easier for patients who can’t get into a clinic at a certain time or are restricted with hours of the day.” |  |

### Theme: Implementation considerations

| Desire to see some patients | Maria “Sometimes I felt with certain clients that I would really like to have been able to see exactly what they were describing and perhaps see what their knee joints looked like and how they were actually walking” Emma “I guess, some patients – there’s a couple that were getting aggravated by a similar exercise, and I get the – trying to describe over the phone what they were doing - that was probably the hardest thing. If I could have got eyeballs on them and said, “You’re doing XYZ wrong.” That may have made it easier, but you can work around it.” |  |
| Erring on side of caution | Karen “I had one participant who had a flare up… if I had been able to see her, maybe my expectations might have been different…it probably didn’t have a big impact; the exercises didn’t cause the issue and there’s still no issues with her doing exercises, it just might have helped me to understand what was going on for her.” Maria “There was one patient in particular who was quite elderly and her knees sounded like they were pretty bad in terms of arthritis. I ended up erring on the side |
of caution very much with her and being very gentle in terms of what we were doing.”

Jane “for me, I do like watching people walk. I like to watch people get out of the chair. They’re the two things I really like being able to do. I guess I would ask people about those activities and just ask them to describe what’s happening – I think if I wasn’t sure I’d just play it safe with my advice.”

Luke “sometimes I would just, particularly that first week, deliberately start low level as well to really start on the easier bands just because I wanted to know the next week when I called them how they responded. Even if I thought they could have handled more, I just wanted to know. So I always felt we’d started lighter than what I should have”

Jane “The ability to do it over the phone was dependent on having those resources…I think the effect and the ability to do it on the phone is, in part, dependant on them having access to resources. I’m not sure it would go quite as well if you just called someone and they didn’t have anything else in front of them.”

Maria “I think the explanations were pretty good and I don’t think anyone came back to me and said they had looked at the videos, but they certainly did look at the pictures and read the instructions. I think it was quite well set out and easy for people to use.”

Ian “having the information already in the patient’s hand is definitely an advantage because they’ve got the tools that they can just refer to at their fingertips. That works in our favour, so we don’t have to provide that information or put together the exercise programmes. They’ve got all the advice and the exercises there with them. That’s definitely an advantage.”

Gavin “obviously because they’re in the program they’ve generally been screened pretty well to being specific to one condition. So, I don’t know how well that would go in a different context if we were trying to treat different conditions”

Maria “I guess once we are getting into more significant levels of disabilities and perhaps other comorbidities, I probably would be a bit more happy to assess them face to face first, and then perhaps go on to tele-stuff. The large majority of people who I think over the phone would be phone if you were just dealing with the OA.”

Karen “There has to be some criteria or tightness around people’s diagnosis and their issues…If you’ve got a patient – they’re there to see you for knee OA and there’s some clarity around that and this studies their biggest functional limitation or technical issue, then they’re stable to do exercise and you’re confident they can do exercise then I think it’s a great medium to treat people with.”

Maria “I certainly think the health coaching training we had was really useful because that was all about, I guess, assisting patients to become self-managed themselves, basically. It is kind of what we do in physio but I don’t think we are really trained specifically to do that as well as it could be and that needs to be the emphasis with this sort of [telephone] program.”

Karen “For most physios, [telephone-delivered care] would be a very big departure from their standard clinical practice face-to-face. I think there’s a huge amount of training that would need to be done…Communication skills or health coaching kind of things”

Gavin “it’s certainly a different approach to what a lot of physios are used to… I think [the training] we had was quite useful in setting us up to then going on with the rest of it.”
9.4 Discussion

The aim of this study was to explore if the experience of delivering telephone-delivered exercise therapy for people with knee OA shifts physiotherapists’ perceptions about such services. We found that, although physiotherapists may be initially sceptical of new models of service delivery like telephone-delivered care, first-hand experience can help shift negative perceptions and may therefore help facilitate future implementation of such services.

Prior to the intervention, physiotherapists in our study expressed some concern about the lack of physical and visual contact with patients when consulting via telephone and believed that their relationship and rapport with patients would suffer. These expectations of telephone-delivered care reflect those found in a recent qualitative study which aimed to explore service provider’s perceptions of telerehabilitation for patients referred to public neurosurgical and orthopaedic specialist services [30]. The 15 physiotherapists that were interviewed in that study, most with no prior experience with telerehabilitation, believed that telerehabilitation would have some limitations when compared to standard in-person care. These included difficulties building rapport, inability to perform hands-on techniques, and having reduced treatment options at their disposal. These findings also
broadly reflect the findings from our recent survey of physiotherapists’ perceptions of telephone-delivered exercise therapy, where most respondents did not agree that telephone-delivered care by a physiotherapist would be effective, safe, or acceptable for managing people with knee and/or hip OA [21].

However, we found that our physiotherapists’ negative perceptions about telephone-delivered care shifted with first-hand experience. After delivering the intervention, physiotherapists found that they experienced fewer problems than anticipated, they developed a strong rapport with patients, and adherence with prescribed exercise was high. Consequently, most physiotherapists had developed increased enthusiasm for telephone-delivered care. This disparity between expectations and experiences may partly be because physiotherapists are not traditionally trained to provide care remotely, or without physical and visual contact with their patient. In fact, entry-level physiotherapy training typically focuses on biomedical models of care (i.e. biological aspects of injury or pain), with particular emphasis on assessment and treatment of physical strength, movement, and function [31]. This is also apparent in the current “culture” of physiotherapy practice, which emphasises ‘hands-on’ anatomical, biomedical, and biomechanical models of care [31]. Inaccurate beliefs about benefits of exercise for knee OA may also have contributed to the mismatch between expectations and experience, given a survey of UK-based physiotherapists has shown that only 56% of physiotherapists largely/totally agree that knee problems are improved by exercise [32].

The importance of first-hand experience is highlighted by research exploring how clinicians change their practice. For example, one study involved interviews with 23 clinicians (nurses, allied healthcare professionals, and an Aboriginal health worker) to
explore how attitudes and beliefs influence the implementation of lifestyle risk factor management in primary healthcare [33]. Interviewees believed that to feel confident providing an intervention, they needed to understand how to do so through direct experience with patients. Another qualitative study interviewed 15 primary care physicians to explore their perceptions about changing their clinical practice [34]. They believed that to overcome feelings of discomfort when introducing new practices or ceasing current practices, direct experience was required. They also believed that successful “unlearning” of habits (e.g. prescribing exercise without visual or physical contact as required by our study physiotherapists) required repeated experience using the practice change. Our findings suggest that for physiotherapists to feel confident and comfortable delivering care via non-traditional methods, exposure or direct first-hand experience is required.

Another previous study qualitatively explored physiotherapists’ perceptions about delivering care via telephone. Sixteen physiotherapists who delivered care via the UK PhysioDirect telephone service, which provides initial assessment and advice for people with varied musculoskeletal disorders, were interviewed before and after experience [35]. Prior to experience, the main concerns expressed by physiotherapists were being limited to only providing generalised treatment, given their inability to observe patients, and being unable to communicate effectively or develop rapport via telephone. After experience, physiotherapists found that they were indeed only able to provide generalised advice, that telephone calls restricted their normal therapeutic relationship and rapport, that it impaired continuity of care (as patients in the PhysioDirect service are unlikely to speak to the same physiotherapist more than once), and that it disengaged patients (as few tried to recontact the service). However, they felt that PhysioDirect was a useful way in
which to provide patients with advice about self-management. Somewhat similarly, before experience our physiotherapists also expressed concerns about the lack of physical and visual contact with patients when consulting via telephone and felt unsure about how this might impact rapport. However, our physiotherapists’ perceptions changed after experience and contrasted with those of the PhysioDirect therapists. This might be because the PhysioDirect service is designed to provide initial advice for a broad range of patients, including those presenting with acute conditions and those seeking a diagnosis. Our intervention was tailored for a specific patient group who did not require diagnosis, and involved numerous consultations with the same physiotherapist over an extended period, during which the aim was to develop a long-term self-management program involving exercise and physical activity. In addition, our physiotherapists were intensively trained in behaviour change techniques and person-centred practiced prior to starting the trial [25], which likely helped them provide more personalised and supportive care.

Our physiotherapists identified numerous advantages of telephone-delivered care. For example, they believed that it was convenient for patients, helped improve exercise adherence, and led to improvements in confidence, pain, and function. This reflects the findings of our qualitative study exploring the experiences of the patients in the trial who received care via telephone (n=20) [36]. Importantly, and somewhat paradoxically, both physiotherapists and patients found that they were able to talk at a more personal level via telephone than when in-person and that they developed a strong sense of rapport. These findings challenge misconceptions that telehealth is “impersonal” [37] and suggest that personalised care can be provided remotely via telephone, and that a strong rapport can develop between patients and therapists even without physical or visual contact. In
fact, there is evidence that the therapeutic alliance is strengthened when patients and therapists talk in more detail about the patient’s specific needs [38].

Our findings have clinical implications. Physiotherapists believed that the ‘hands-off’ nature of telephone consultations helped shift patient expectations of care, leading to better patient engagement in self-management and improved adherence to prescribed exercise. There is evidence that patients with low back pain expect to receive hands-on treatment procedures and physical examinations from physiotherapists [39, 40] and are more satisfied when they receive hands-on therapy [41-43]. Physiotherapists often feel as though they have to provide hands-on therapy in order to meet patient expectations [31]. Our findings suggest that remotely-delivered consultations have can help shift patient expectations away from being a passive recipient of hands-on therapies to being a more active participant in self-management of their condition. It is thus possible remotely-delivered consultations may also be applicable for other chronic conditions where hands-on therapies are less effective and active self-management involving exercise is recommended (e.g. chronic low back pain).

Our findings also have implications for the design of future telerehabilitation services. Physiotherapists, as well as the patients in our other qualitative study [36], expressed a preference for some visual contact during telephone consultations. This suggests that video conferencing for consultations may be the ideal mechanism for implementing remote models of service delivery. Physiotherapists (and patients [36]) both emphasised that comprehensive written resources, including educational material and exercise instructions/photos, were essential to the effectiveness of the intervention. As such, future service providers should ensure that these elements are incorporated into service models.
Our physiotherapists found that preparing for, and conducting, telephone calls was difficult to schedule amongst the in-person consultations being conducted in a usual day in their clinical setting, preferring to do them after-hours or on days that they were not in their clinics. Future services should consider “blocks” of telephone consultations, rather than interspersing them amongst in-person consultations. Careful screening of patients is also required prior to booking telephone consultations to ensure patient safety, and that their health condition is amenable to a self-management approach. Similarly, telephone services should not replace in-person consultations with a physiotherapist for patients who require a diagnosis of their health condition.

It is important that future telerehabilitation service providers consider training their clinicians in communication skills prior to delivering care via telephone [44]. Physiotherapists in our study believed training in communication or health coaching was necessary. Currently, there is no evidence to inform appropriate training for improving clinicians’ telephone consultation skills [45]. Our physiotherapists completed an intensive training program in person-centred care and behaviour change techniques prior to the trial, involving two initial training days, a 3-month practice phase, and a final follow-up training day. After training, all felt confident and prepared to begin the trial and believed that they were better able to provide care that was person-centred [25]. Physiotherapists who provide care via the UK telephone service PhysioDirect are also required to complete training to enhance listening and interviewing skills [46], involving one-and-a-half days of workshop, a practice period, and a competency check involving observation of telephone consultations.
Strengths of our study include the use of pre- and post-intervention interviews to gain a better understanding of how physiotherapists’ perceptions of telephone-delivered exercise therapy shifted with experience, and our evaluation of a robust, clearly-described intervention [23] that can be replicated outside of the research setting. Our study also has a number of limitations. Our study was nested within a RCT, which constrained our sample to the physiotherapists who participated in the trial. Our physiotherapists volunteered to participate in the trial and their perceptions and experiences may not be generalisable to the broader population of physiotherapists.

In conclusion, we found that although physiotherapists were initially sceptical about the effectiveness of telephone-delivered service models for knee OA, perceptions shifted once they experienced delivering care via this non-traditional method. Findings suggest that first-hand experience may be necessary for physiotherapists to embrace new models of service delivery.

References


Chapter 9. Physiotherapists’ perceptions of telephone-delivered exercise


22. Lawford, B.J., Bennell, K.L., and Hinman, R.S., Consumer perceptions of and willingness to use remotely delivered service models for exercise management of


Chapter 10 Discussion and implications

The overall objective of this thesis was to investigate the acceptability of telerehabilitation amongst people with OA and physiotherapists, and to explore the experiences of physiotherapists who had been trained to deliver such services. This chapter summarises the main findings of this thesis, implications of these findings, strengths and limitations of the research, and directions for future research.

10.1 Summary of main findings

Study 1 (Chapter 3) investigated the perceptions people with hip and/or knee OA have towards the remote delivery of exercise therapy by a physiotherapist. This study found that people with OA had mostly positive perceptions towards both telephone- and video-mediated consultations, believing telerehabilitation could save them time, would be easy to use, and would maintain their privacy. More than 50% of people with OA agreed or strongly agreed with 15 of 17 attitude statements relating to video-mediated consultations, and 13 of 17 for the telephone. However, most (>50%) did not agree that they would like the lack of physical contact with the physiotherapist or that they would be willing to pay for telerehabilitation services. In addition, most did not agree that telephone-delivered exercise therapy would be effective or that the physiotherapist would be able to adequately monitor their OA via telephone.

Study 2 (Chapter 4) investigated physiotherapists’ perceptions of, and willingness to use, telephone- and video-mediated consultations for provision of exercise therapy for people with knee and/or hip OA. This study found that physiotherapists had overall positive perceptions towards the delivery of exercise via video, but were significantly less positive
about the delivery of exercise via telephone. More than 50% of physiotherapists agreed or strongly agreed with 15 of 16 attitude statements relating to video-mediated consultations, but only 6 of 16 for the telephone. Whilst physiotherapists agreed that telephone- and video-delivered exercise therapy would offer time-saving and privacy advantages for people with OA, most physiotherapists believed that they would not like the lack of physical contact with patients. In addition, most physiotherapists did not agree that telephone-delivery would be a safe, effective, useful, or acceptable way in which to provide care.

Study 3 (Chapter 6) explored physiotherapists’ experiences with, and the impacts of, a training program in person-centred practice to support exercise adherence over the telephone in people with knee OA. This study found that, although physiotherapists found training overwhelming initially, they felt more confident and able to provide person-centred care by the end of training. Physiotherapists particularly valued the period of skills practice with patients and the follow-up training day. After completion of training, physiotherapists’ beliefs about their role managing patients had changed, and this had positively changed their practice.

Study 4 (Chapter 7) aimed to evaluate the fidelity of physiotherapists to the person-centred practice and behaviour change techniques taught during the training program in Study 3. This study found that physiotherapists performed moderately well when implementing person-centred practice principles and behaviour change techniques over the telephone immediately after training, with room for improvement from further practice and/or training prior to trial commencement. Physiotherapists’ self-ratings of
their own performance generally agreed with expert ratings, however they tended to underestimate their ability to implement some principles and techniques.

Study 5 (Chapter 8) explored the perceptions of people with knee OA who received exercise therapy from physiotherapists via telephone. This study found that participants held mostly positive perceptions about their experience, valuing the convenience, accessibility, and sense of undivided focus and attention. Participants also believed that they were able to communicate effectively via telephone and were able to build strong rapport with their physiotherapist. However, some desired visual contact with the physiotherapist. In general, telephone-delivery was not viewed as a substitute for face-to-face care, but rather as a new option that could increase the accessibility of physiotherapy services for people with knee OA, particularly for follow-up consultations.

Finally, Study 6 (Chapter 9) explored whether the experience of delivering exercise management via the telephone for a clinical trial changed physiotherapists’ perceptions about such a service. This study found that, before experience, physiotherapists believed that the telephone should only be used for follow-up with patients, and, although they thought it would be convenient and cost-saving for patients, they expressed concern about the lack of physical and visual contact. After experience, physiotherapists found that the lack of physical and visual contact was less of an issue than initially anticipated and were pleasantly surprised by the range of positive outcomes they were able to achieve with patients.
10.2 Implications of findings

Findings from this thesis contribute to a deeper understanding of how telerehabilitation is perceived by people with OA and physiotherapists. Findings also contribute to a better understanding of how clinicians can be trained in behaviour change support and person-centred care for delivery via telephone. These findings have a number of implications for the design and implementation of future telerehabilitation services and clinician training programs.

10.2.1 Acceptability of telerehabilitation

People with OA and physiotherapists who participated in the surveys (Chapter 3 and 4) perceived that video consultations were an acceptable, safe, and effective way in which to deliver/receive care. In contrast, there was evidence that people with OA and physiotherapists, most of whom were inexperienced with receiving and delivering telerehabilitation (respectively), were sceptical about the effectiveness of telephone-delivery. For example, most people with OA did not agree that telephone-delivered care would be effective, or that a physiotherapist would get an adequate understanding of their OA via telephone. Physiotherapists’ perceptions were even more unfavourable, with most not agreeing that telephone-delivery would be either safe, effective, acceptable, or useful. Collectively, these findings suggest that, in the absence of any prior experience with telerehabilitation, both people with OA and physiotherapists may be reluctant to engage with telephone-delivered services. Establishing these services may therefore be challenging, with potential difficulties recruiting clinical staff or, if such services are established, there is a risk that patient uptake may be poor.
However, in this thesis, first-hand experience receiving/delivering care via telephone was found to shift people’s negative perceptions of these services. People with OA and physiotherapists who received/delivered care via telephone as part of the Telecare trial (Chapter 8 and 9) both recalled being somewhat sceptical about the effectiveness of telephone-delivered care prior to participating in the trial. Yet they described mostly positive experiences, were surprised that they were able to receive/deliver personalised care, and achieved positive outcomes including improvements in pain, function, and confidence. This shift in perceptions with first-hand experience broadly reflects the findings of previous research. Brief experience using with a complex videoconferencing system was found to have a significant positive effect on the attitudes that people with chronic pain have towards telehealth, particularly regarding its ease of use and perceived usefulness (Cranen et al., 2011; Demiris et al., 2001; Huis in ’t Veld et al.), though none of these studies were in physiotherapy. Although no previous studies have explored changes in clinician’s perceptions about telerehabilitation after experience, Study 2 of this thesis (Chapter 4) did find that physiotherapists who had prior experience delivering care via telerehabilitation were significantly more likely to be interested in delivering such services. Though this was only significant for video-delivered care, not telephone. Collectively, these findings suggest that experience using telerehabilitation service models can improve the perceived acceptability of such services amongst patients and physiotherapists.

The disparity between expectations and experiences may reflect the fact that physiotherapy is commonly viewed as being ‘hands-on’ (Thornquist, 2006) and many patients seeking physiotherapy care expect to receive hands-on treatment. For example, patients with chronic low back pain often expect to receive physical examinations and
hands-on treatment procedures when consulting with a physiotherapist (Hills & Kitchen, 2007; Parsons et al., 2007). Although hands-on therapies are only recommended as adjunct management methods for people with OA, there is evidence that many people with OA are unaware of current management recommendations for the condition. For example, more than half of 1,276 adults with knee OA in the UK did not agree that exercise or physical activity improves knee pain or that increasing the strength of muscles around the knee is important (Holden et al., 2012). In addition, of the 330 people with OA who completed the survey in Chapter 3 of this thesis, almost one-third did not agree that exercise was beneficial for OA. This highlights the importance of educating patients about the benefits of exercise and the importance of self-management of OA. Doing so may help improve attitudes towards remotely-delivered, ‘hands-off’, models of service delivery and shift expectations away from hands-on therapy. In addition, reassuring patients about the safety and effectiveness of ‘hands-off’ care may also help engagement and uptake. For physiotherapists, specific training in, or exposure to, the provision of care remotely may be necessary to help therapists feel more comfortable and confident consulting without visual or physical contact (discussed further in Section 10.2.2).

People with OA and physiotherapists identified many advantages of telephone-delivered care, including its convenience and positive impact on pain, function, and confidence. Somewhat paradoxically, people with OA and physiotherapists also found that they were able to communicate effectively, provide/receive personalised care, and have a strong rapport via telephone. This contradicts common misconceptions that telerehabilitation is “impersonal” (Kayyali et al., 2017) and instead suggests that telephone-delivered care can foster a sense of personalised, undivided focus and attention that encourages an effective dialogue between patients and clinicians. This also reflects the perceptions of
other healthcare clinicians who have delivered care via telephone. Focus group interviews with 20 telehealth professionals (i.e. nurses, paramedics) found that they believed consulting via telephone can create an atmosphere that fosters sharing of personal information and a non-judgemental attitude when consulting with patients who have a chronic illness (Heckemann et al., 2016). These findings suggest that telephone-delivery is one way in which to provide personalised and supportive care that can encourage exercise adherence and engagement in self-management, provided clinicians are appropriately trained (discussed in Section 10.2.2). Further research is necessary to evaluate changes in exercise self-efficacy and adherence after receiving telephone-delivered exercise therapy, and whether outcomes differ compared to more traditional face-to-face consultations.

There were also some perceived disadvantages of telerehabilitation. The vast majority (>75%) of people with OA and physiotherapists who participated in the surveys (Chapter 3 and 4) did not agree that they would like the lack of physical contact when consulting via telephone or video. As discussed previously, this may reflect preconceptions about physiotherapy being ‘hands-on’ (Thornquist, 2006). Interestingly, however, the lack of physical contact was not highlighted as being an issue amongst people with OA and physiotherapists who participated in the Telecare trial (Chapter 8 and 9). In fact, physiotherapists found that the ‘hands-off’ nature of consultations had numerous advantages, such as contributing to a change in patient expectations, and facilitating a detailed and personalised discussion between patients and clinicians. Physical touch is said to have an important role in the development of trust between patients and physiotherapists (Bjorbaekmo & Mengshoel, 2016; Hiller et al., 2015; Roger et al., 2002), yet findings from this thesis suggest that rapport can be developed without physical
contact. In addition, the people with OA who received care via telephone felt confident
performing their exercise programs without physical supervision (Chapter 8), again
suggesting that having physical contact with the clinician may not always be necessary
for patients to perform exercise safely and effectively. However, further research is
required to confirm and explore this.

Another perceived disadvantage of telephone-delivered care was the lack of visual
contact. Some people with OA and some physiotherapists who received/delivered care
via telephone (Chapter 8 and 9) expressed a desire for some visual contact, primarily to
confirm exercise technique or perform objective assessments. Despite this, people with
OA did feel confident performing their exercise programs and believed that the
written/verbal exercise instructions were easy to understand. Similarly, physiotherapists
found that there were ways in which they could work around the lack of visual contact
(e.g. being conservative when prescribing exercise and giving more detailed descriptions
of exercise than usual). Interestingly, nurses and paramedics who provide care for people
with chronic illnesses via telephone believed the lack of visual contact was advantageous
in that it facilitated a less judgemental attitude during consultations, also giving a sense
of anonymity and allowing patients to feel comfortable sharing personal information
(Heckemann et al., 2016). No previous research has explored the importance of visual
contact in physiotherapy, and whether its absence has a negative impact on the
effectiveness or quality of care that is provided. However, findings from this thesis
suggest that flexibility in physiotherapy service delivery is probably optimal, with options
for initial in-person consultations for those who desire it, or a blended approach of
telephone and video consultations for others.
In general, telephone-delivered care was not viewed by people with OA or physiotherapists as a substitute for in-person consultations, but rather as a new alternative for people who may experience difficulties attending clinics. Telephone-delivered care, and telerehabilitation more broadly, are examples of ‘disruptive innovations’ that have the potential to disturb and displace existing markets (Marshall et al., 2018). Disruptive innovations are often successful because they offer more convenient and affordable services for customers who were previously excluded from the market (Hwang & Christensen, 2008). For example, telerehabilitation models of service delivery may open the market to people who had previously had difficulty attending clinics in-person. It has been suggested that the benefits of telerehabilitation are more likely to be realised if these services are integrated into existing established in-person services (Marshall et al., 2018). Similarly, stepped-care models of care that incorporate telerehabilitation services have been proposed (Slater et al., 2016), where all patients are initially referred to, or provided with, the opportunity to participate in lower-cost, accessible interventions (e.g. telephone-delivered care) prior to the use of more intensive in-person consultations. Further research is required to determine how telerehabilitation service models can best be integrated into existing “face-to-face” physiotherapy services.

Findings from this thesis have a number of implications for the design and implementation of future telephone services. Given that people with OA and physiotherapists both believed that the patient resource folder containing exercise pictures and descriptions was essential to the success of the intervention, future service providers should consider providing similar resources to their patients. The use of a pre-treatment questionnaire likely helped physiotherapists provide more personalised care via telephone, and thus this should also be considered by future service providers. As
highlighted by Telecare physiotherapists (Chapter 9), implementing telephone models of service delivery may necessitate a change to private practice business models. For example, physiotherapists found that it was difficult to prepare for, and conduct, their telephone consultations in their usual clinical settings, instead preferring to conduct them after-hours or on days that they were not in their clinic. This suggests that it may be more feasible to allocate “blocks” of time for telephone consultations, rather than attempting to intersperse them between in-person consultations. Physiotherapists also highlighted the fact that they would not feel comfortable consulting with patients who had not already been screened prior to participation. Future services should thus also consider implementing a patient screening process to ensure that the patient’s health condition is amendable to a self-management approach. Services could also incorporate initial in-person consultations for patients who require an initial diagnosis or are identified as requiring manual “hand-on” therapies, or those who are at high-risk of not responding effectively to a self-management home-based exercise approach delivered remotely.

Another important element of implementation to consider is funding of telerehabilitation services. Most people with OA who completed the survey (Chapter 3) did not agree that they would be willing to pay for a telephone- or video-delivered physiotherapy service. In the current Australian healthcare climate, this suggests that telerehabilitation service models may be better suited to public healthcare sectors, where out-of-pocket payments are typically not required or are vastly reduced compared to the private sector. Currently, in Australia, the delivery of physiotherapy via telerehabilitation is not funded by public healthcare or private health insurers, which creates a considerable disincentive for implementation of these services. The Australian public healthcare sector does currently provide reimbursement for telehealth services that are provided by medical specialists,
physicians, or psychiatrists, depending on the geographic remoteness of the patient (Australian Department of Human Services, 2018). Given the increasing interest in telerehabilitation service models, it may only be a matter of time before allied healthcare services are also recognised. Further research into the potential cost-effectiveness of physiotherapy telerehabilitation services is likely to provide additional advocacy for expanding funding models for these services by both the Australian Medicare system and private health insurers.

10.2.2 Physiotherapist training

Findings from this thesis highlight the importance of physiotherapist training for telerehabilitation. All physiotherapists who delivered care via telephone (Chapter 9) spoke of the importance of effective communication skills and believed that preparatory clinician training would be essential for future services. A recent Cochrane review found that there was insufficient evidence to inform the training of clinicians in telephone consultation skills (Vaona et al., 2017). However, physiotherapists who completed the Telecare study believed that the focus and content of their training program (i.e. in behaviour change support and person-centred care) was appropriate and gave them the skills and knowledge necessary to provide personalised and supportive care via telephone. Similarly, telehealth clinicians (nurses and paramedics) who provide care via telephone for people with chronic disease also believed training programs should focus on the provision of person-centred care (Heckemann et al., 2016). In fact, those healthcare professionals believed that telephone-delivery of care created a confidential and non-judgemental environment that enhanced their ability to provide person-centred care (Heckemann et al., 2016).
Chapter 10. Discussion and implications

The importance of training in communication skills is also highlighted by the fact that physiotherapists are not traditionally trained to provide care during consultations where physical and visual contact with patients is not possible. Entry-level physiotherapy training typically emphasises biomedical models of care, involving a focus on physical assessment and treatment of physical strength, movement, and function (Foster & Delitto, 2011). In addition, the current “culture” of physiotherapy practice also emphasises ‘hands-on’ anatomical, biomedical, and biomechanical models of care (Foster & Delitto, 2011). As such, when physiotherapists consult via telephone, they cannot utilise any of their visual or physical assessment skills and are thus required to change their practice to focus on having a detailed discussion with patients. Given that it is reportedly difficult to change physiotherapists’ practice (Foster & Delitto, 2011; Stevenson et al., 2004), training in person-centred communication skills and the delivery of care via telerehabilitation should ideally be provided early in physiotherapists’ careers, before clinical practice habits have formed. In Australia, some universities currently offer undergraduate elective courses and graduate certificates in clinical telehealth (The University of Queensland, 2018), though they are not specifically developed for physiotherapists. The Australian Centre for Rural and Remote Medicine also provides online telehealth training for clinicians and practice managers (Australian College of Rural and Remote Medicine, 2018), though this is primarily aimed at medical practitioners or specialists, rather than physiotherapists. Given that the role and scope of physiotherapy practice is expected to change in the coming years (Australian Physiotherapy Association, 2013), training in health coaching and telehealth consultation skills is likely to become increasingly important. For example, the ageing population is expected to increase demand for chronic and complex disease, with a greater focus on
Physiotherapists’ experiences completing training in behaviour change support and person-centred practice (Chapter 6) have implications for the future design and implementation of similar training programs. Although our physiotherapists valued the training that they received, they did recall feeling overwhelmed and anxious about the volume of new information and new terminology presented during the first two training days. This may have been partly because much of the training material was unfamiliar to them and had not been previously taught during their undergraduate training. To avoid pushing physiotherapists too far outside of their comfort zone, future training programs may benefit by reducing the volume of new information delivered initially, or by spreading content over more training days. This also again highlights the importance of introducing these biopsychosocial principles and concepts early in physiotherapists’ careers, perhaps by incorporating such training into undergraduate training programs (Foster & Delitto, 2011).

After feeling overwhelmed and anxious, physiotherapists’ confidence in their skills increased after they completed the practice phase of training and final training day (Chapter 6). In fact, they believed that the practice phase of training, as well as the final training day, was essential to their skill development. Future training programs should thus also include periods of deliberate practice and follow-up training days to help consolidate skill development. Audit findings (Chapter 7) demonstrated that physiotherapists were using person-centred practices and behaviour change techniques moderately well during the practice phase, although there was still some room for
improvement. This suggests that further “refresher” training may be necessary to ensure that physiotherapists continue to develop their skills. Given that physiotherapists in this study had continued practice during the Telecare trial, other physiotherapists may require additional longer-term follow-up training days or extended periods of practice beyond that of what was described in our training program.

10.3 Strengths of the research

Strengths of each individual study within this thesis have been highlighted within their respective chapters. This section will provide an overview of the main strengths of the research.

A major strength of this body of research is the focus on implementation science. Implementation science is the study of methods to promote the adoption and integration of research findings into routine practice to improve the quality and effectiveness of health services (Bauer et al., 2015). Implementation science typically employs mixed-methods designs to identify factors that might have an impact on the uptake of new services or models of care, including the perceptions of patients, providers, and the broader community. The body of research within this thesis utilised both qualitative and quantitative methods to gain a more detailed and in-depth understanding of people’s perceptions of telerehabilitation. Studies within this thesis investigated the perceptions of both people with OA and physiotherapists, which gave a better understanding of the overall acceptability of telerehabilitation amongst users from the perspectives of both giving and receiving care. In addition, this thesis explored the perceptions of people with OA and physiotherapists who were both inexperienced (Chapter 3 and 4) and experienced (Chapter 8 and 9) with telerehabilitation. This allowed a better understanding of the
acceptability of telerehabilitation within the wider community, not just the research setting. Finally, Telecare physiotherapists were interviewed both before and after delivering care via telephone (Chapter 9), which gave a better understanding of how their perceptions changed with experience.

Another strength is the generalisability of the research findings. Both surveys (Chapter 3 and 4) collected data from people with OA and physiotherapists who lived/practiced in rural, regional, and metropolitan areas across all states of Australia. Our cohorts also comprised a range of males and females who were employed and unemployed, and highly and lowly educated. In addition, people with OA who participated in the Telecare trial (Chapter 8) were also recruited across rural, regional, and metropolitan areas across all states of Australia, and interviews were conducted with a range of males and females who were employed and unemployed, and obese and normal weight. As such, the results and findings of this thesis are generalisable to a broad range of people with OA and physiotherapists within the community.

For the studies investigating physiotherapist training (Chapter 6 and 7), a major strength of the research is, again, the use of qualitative and quantitative methods. This allowed a more detailed understanding of training experiences and changes in beliefs, while also assessing skills using person-centred practices with patients. Another strength is that physiotherapists completed a training program that is commercially available to all healthcare professionals across Australia, not just physiotherapists. As such, findings are generalisable to a broad range of clinicians. Another strength is the use of qualitative interviews both before and after training, which gave a better understanding of how attitudes and beliefs had shifted. Finally, both physiotherapists and the ‘expert’ training
facilitator completed skills audits using audio recordings of practice consultations. This was a direct measure of skill levels, rather than retrospective self-report of performance, and the use of self-audits alongside expert audits also increased the robustness of findings.

10.4 Limitations of the research

The limitations of each individual study have been highlighted within their respective chapters. This section outlines the main limitations of the research.

Studies within this thesis were conducted within Australia, and so the perceptions and attitudes of participants may not be generalisable to people within other countries where physiotherapy practice may differ. In addition, most (>50%) survey participants (Chapter 3 and 4) and Telecare volunteers (Chapter 8) were recruited using online advertisement methods (e.g. Facebook), and thus many may have already been familiar with, and comfortable using, technology. As such, findings from this thesis may not be generalisable to people who are inexperienced with, or feel uncomfortable using, technology. Similarly, Telecare participants who were interviewed (Chapter 8) had volunteered to participate in the trial and also agreed to an interview. As such, findings may be biased towards those who already have positive perceptions about telephone-delivered care or who are more willing to share their experiences.

The sample of physiotherapists for three studies within this thesis (Chapter 6, 7, and 9) were constrained to the eight who delivered the Telecare trial. These physiotherapists applied to deliver care for the trial, and thus may have more positive perceptions toward the delivery of care via telephone than other physiotherapists. In addition, Telecare physiotherapists were mandated to undergo training and were reimbursed for their time.
Thus, findings may not be generalisable to physiotherapists who are unwilling to invest time in training. Physiotherapists’ skills using behaviour change techniques and person-centred principles were also not assessed prior to training, so it is not clear whether these skills improved after training. From this research, it is also not clear whether changes in physiotherapists’ perceptions about, or skills using, behaviour change techniques and person-centred care are sustained in the long-term.

10.5 Directions for future research

Findings from this thesis highlight a number of directions for future research. Currently, there is limited evidence to support the effectiveness of telephone-delivered exercise therapy by physiotherapists for people with OA. Although findings from this thesis suggest that telephone-delivered care is acceptable to people with OA, further research is required to determine whether it leads to improvements in exercise self-efficacy and engagement in self-management, including how outcomes compare to traditional in-person consultations. To better inform uptake and implementation of telerehabilitation service models, future research should evaluate the cost-effectiveness of these models of service delivery. Further research is also required to determine how telerehabilitation services can best be incorporated into existing public and private business models. Given that findings from this thesis indicate that hybrid models of service delivery (i.e. combining in-person, telephone, and video consultations) may be more acceptable to some people with OA and some physiotherapists, future research should investigate the effectiveness or feasibility of such models of service delivery. To determine whether telerehabilitation service models are better suited to particular sub-groups of people with OA, and whether they therefore should be targeted at particular patients, future research should include moderator analyses of outcomes from clinical trials. Finally, future
research should investigate the effectiveness and acceptability of telerehabilitation in other chronic musculoskeletal pain populations where best-practice management involves education and exercise (e.g. chronic low back pain).

The importance of clinician training in communication skills was highlighted by studies within this thesis. Further research is required to inform the content and delivery of such training programs, and whether they can be implemented into entry-level physiotherapy training degrees. Although physiotherapists within this thesis believed that their beliefs and practice had changed following training, further research is required to determine whether these changes are sustained in the long-term. Finally, future research should investigate whether such training programs in person-centred care correspond to changes in patient outcomes or adherence to exercise.

10.6 Conclusion
Collectively, findings from this thesis suggest that, overall, telerehabilitation is perceived to be an acceptable model of service delivery by people with OA and physiotherapists. Although there was evidence of scepticism about the effectiveness of telephone-delivered care amongst those who are inexperienced, these perceptions appeared to change with experience. People with OA and physiotherapists who received/delivered care via telephone as part of the Telecare trial believed that it improved exercise adherence and engagement in self-management, and also facilitated a more detailed and personalised discussion. Physiotherapists highly valued the preparatory training program in behaviour change techniques and person-centred care, believing that it changed their perceptions about their role managing patients with OA and helped them communicate effectively via
telephone. Findings from this thesis will inform the future design and implementation of telerehabilitation services and clinician training programs.
References


References


References


References


following total knee arthroplasty. *International journal of environmental research and public health*, 10(9), 3998-4011.


osteoarthritis in his or her lifetime. *Osteoarthritis and Cartilage, 18*(11), 1372-1379.


patients with hip or knee osteoarthritis. *Cochrane Database of Systematic Reviews, 10*, CD010203.


References


Appendices

Appendix A: Copyright permission for Chapter 3

TERMS AND CONDITIONS
This copyrighted material is owned by or exclusively licensed to John Wiley & Sons, Inc. or one of its group companies (each a “Wiley Company”) or handled on behalf of a society with which a Wiley Company has exclusive publishing rights in relation to a particular work (collectively “WILEY”). By clicking “accept” in connection with completing this licensing transaction, you agree that the following terms and conditions apply to this transaction (along with the billing and payment terms and conditions established by the Copyright Clearance Center Inc., (“CCC’s Billing and Payment terms and conditions”), at the time that you opened your RightLink account (these are available at any time at http://wijnaccount.copyright.com).
Appendix A

Terms and Conditions:

- The materials you have requested permission to reproduce or reuse (the "Wiley Materials") are protected by copyright.

- You are hereby granted a personal, non-exclusive, non-sub-licensable (on a stand-alone basis), non-transferable, worldwide, limited license to reproduce the Wiley Materials for the purpose specified in the licensing process. This license, and any CONTENT (PDF or image file) purchased as part of your order, is for a one-time use only and limited to any maximum distribution number specified in the license. The first instance of republication or reuse granted by this license must be completed within two years of the date of the grant of this license (although copies prepared before the end date may be distributed thereafter). The Wiley Materials shall not be used in any other manner or for any other purpose beyond what is granted in the license. Permission is granted subject to an appropriate acknowledgement given to the author, title of the material/book/journal, and the publisher. You shall also duplicate the copyright notice that appears in the Wiley publication in your use of the Wiley Material. Permission is also granted on the understanding that nowhere in the text is a previously published source acknowledged for all or part of this Wiley Material. Any third party content is expressly excluded from this permission.

- With respect to the Wiley Materials, all rights are reserved. Except as expressly granted by the terms of the license, no part of the Wiley Materials may be copied, modified, adapted (except for minor reformatting required by the new Publication), translated, reproduced, transferred or distributed, in any form or by any means, and no derivative works may be made based on the Wiley Materials without the prior permission of the respective copyright owner. For STM Signatory Publishers clearing permission under the terms of the STM Permissions Guidelines only, the terms of the license are extended to include subsequent editions and for editions in other languages, provided such editions are for the work as a whole in situ and does not involve the separate exploitation of the permitted figures or extracts. You may not alter, remove or suppress in any manner any copyright, trademark or other notices displayed by the Wiley Materials. You may not license, rent, sell, loan, lease, pledge, offer as security, transfer or assign the Wiley Materials on a stand-alone basis, or any of the rights granted to you hereunder to any other person.

- The Wiley Materials and all of the intellectual property rights therein shall at all times remain the exclusive property of John Wiley & Sons Inc, the Wiley Companies, or their respective licensors, and your interest therein is only that of having possession of and the right to reproduce the Wiley Materials pursuant to Section 2 herein during the continuance of this Agreement. You agree that you own no right, title or interest in or to the Wiley Materials or any of the intellectual property rights therein. You shall have no rights hereunder other than the license as provided for above in Section 2. No right, license or interest to any trademark, trade name, service mark or other branding ("Marks") of WILEY or its licensors is granted hereunder, and you agree that you shall not assert any such right, license or interest with respect thereto.

- NEITHER WILEY NOR ITS LICENSORS MAKES ANY WARRANTY OR REPRESENTATION OF ANY KIND TO YOU OR ANY THIRD PARTY, EXPRESS, IMPLIED OR STATUTORY, WITH RESPECT TO THE MATERIALS OR THE ACCURACY OF ANY INFORMATION CONTAINED IN THE MATERIALS, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, ACCURACY, SATISFACTORY QUALITY, FITNESS FOR A PARTICULAR PURPOSE, USABILITY, INTEGRATION OR NON-INFRINGEMENT AND ALL SUCH WARRANTIES ARE HEREBY EXCLUDED BY WILEY AND ITS LICENSORS AND WAIVED BY YOU.
Appendix A

- WILEY shall have the right to terminate this Agreement immediately upon breach of this Agreement by you.

- You shall indemnify, defend and hold harmless WILEY, its Licensors and their respective directors, officers, agents and employees, from and against any actual or threatened claims, demands, causes of action or proceedings arising from any breach of this Agreement by you.

- IN NO EVENT SHALL WILEY OR ITS LICENSORS BE LIABLE TO YOU OR ANY OTHER PARTY OR ANY OTHER PERSON OR ENTITY FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, INDIRECT, EXEMPLARY OR PUNITIVE DAMAGES, HOWEVER CAUSED, ARISING OUT OF OR IN CONNECTION WITH THE DOWNLOADING, PROVISIONING, VIEWING OR USE OF THE MATERIALS REGARDLESS OF THE FORM OF ACTION, WHETHER FOR BREACH OF CONTRACT, BREACH OF WARRANTY, TORT, NEGLIGENCE, INFRINGEMENT OR OTHERWISE (INCLUDING, WITHOUT LIMITATION, DAMAGES BASED ON LOSS OF PROFITS, DATA, FILES, USE, BUSINESS OPPORTUNITY OR CLAIMS OF THIRD PARTIES), AND WHETHER OR NOT THE PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THIS LIMITATION SHALL APPLY NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY PROVIDED HEREIN.

- Should any provision of this Agreement be held by a court of competent jurisdiction to be illegal, invalid, or unenforceable, that provision shall be deemed amended to achieve as nearly as possible the same economic effect as the original provision, and the legality, validity and enforceability of the remaining provisions of this Agreement shall not be affected or impaired thereby.

- The failure of either party to enforce any term or condition of this Agreement shall not constitute a waiver of either party’s right to enforce each and every term and condition of this Agreement. No breach under this agreement shall be deemed waived or excused by either party unless such waiver or consent is in writing signed by the party granting such waiver or consent. The waiver by or consent of a party to a breach of any provision of this Agreement shall not operate or be construed as a waiver of or consent to any other or subsequent breach by such other party.

- This Agreement may not be assigned (including by operation of law or otherwise) by you without WILEY’s prior written consent.

- Any fee required for this permission shall be non-refundable after thirty (30) days from receipt by the CCC.

- These terms and conditions together with CCC’s Billing and Payment terms and conditions (which are incorporated herein) form the entire agreement between you and WILEY concerning this licensing transaction and (in the absence of fraud) supersedes all prior agreements and representations of the parties, oral or written. This Agreement may not be amended except in writing signed by both parties. This Agreement shall be binding upon and inure to the benefit of the parties’ successors, legal representatives, and authorized assigns.

- In the event of any conflict between your obligations established by these terms and conditions and those established by CCC’s Billing and Payment terms and conditions, these terms and conditions shall prevail.

- WILEY expressly reserves all rights not specifically granted in the combination of (i) the license details provided by you and accepted in the course of this licensing agreement.
transaction. (ii) these terms and conditions and (iii) CCC’s Billing and Payment terms and conditions.

- This Agreement will be void if the Type of Use, Format, Circulation, or Requestor Type was misrepresented during the licensing process.

- This Agreement shall be governed by and construed in accordance with the laws of the State of New York, USA, without regard to such state’s conflict of law rules. Any legal action, suit or proceeding arising out of or relating to these Terms and Conditions or the breach thereof shall be instituted in a court of competent jurisdiction in New York County in the State of New York in the United States of America and each party hereby consents and submits to the personal jurisdiction of such court, waives any objection to venue in such court and consents to service of process by registered or certified mail, return receipt requested, at the last known address of such party.

WILEY OPEN ACCESS TERMS AND CONDITIONS
Wiley Publishes Open Access Articles in All Open Access Journals and in Subscription journals offering Online Open. Although most of the fully Open Access journals publish open access articles under the terms of the Creative Commons Attribution (CC-BY) License only, the subscription journals and a few of the Open Access Journals offer a choice of Creative Commons Licenses. The license type is clearly identified on the article.

The Creative Commons Attribution License
The Creative Commons Attribution License (CC-BY) allows users to copy, distribute and transmute an article, adapt the article and make commercial use of the article. The CC-BY license permits commercial and non-commercial use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes (see below).

Creative Commons Attribution-Non-Commercial License
The Creative Commons Attribution Non-Commercial (CC-BY-NC) License permits use, distribution and reproduction in any medium, provided the original work is properly cited, is not used for commercial purposes and no modifications or adaptations are made. (see below)

Use by commercial “for-profit” organizations
Use of Wiley Open Access articles for commercial, promotional, or marketing purposes requires further explicit permission from Wiley and will be subject to a fee.

Further details can be found on Wiley Online Library
http://olabout.wiley.com/WileyCDA/Section/id-416895.html

Other Terms and Conditions:

v1.10 Last updated September 2015
Questions? customerservice@wiley.com or +1-855-239-3415 (toll free in the US) or +1-678-646-2777.

https://s10c.copyright.com/AppendixPrintableLicense
Appendix B: Telerehabilitation survey for people with osteoarthritis – Chapter 3

PART A- GENERAL QUESTIONS.

The following questions ask about you and your osteoarthritis.

1. Are you……
   □ Male
   □ Female

2. What is your age?
   _______ ___ years

3. What is your postcode?
   _______

4. What is the highest level of education you have completed? (please select one box only)
   □ Primary school
   □ High school
   □ Trade or trade certificate
   □ University or tertiary institute degree
   □ Higher university degree (e.g. Masters, PhD)
   □ Don’t know/unsure

5. How would you describe your financial situation? (please select one box only)
   □ Find it a strain to get by from week to week
   □ Have to be careful with money
   □ Able to manage without much difficulty
   □ Quite comfortably off
   □ Very comfortably off
6. Which joint/s is affected by osteoarthritis? (please select all that apply)

☐ Knee
☐ Hip

7. Which is your most painful osteoarthritic joint? (please select one box only)

Both knees
☐ Left knee
☐ Right knee
☐ equally painful

Both hips
☐ Left hip
☐ Right hip
☐ equally painful

The following 2 questions ask you to rate the pain, on a scale from 0 (no pain) to 10 (worst pain possible) caused by your most painful osteoarthritic joint. This is done by selecting a number on the scale.
Please do not select two numbers, you must choose a whole number.

8. Select the number which indicates the average amount of pain felt over the PAST WEEK in your most painful osteoarthritic joint.

0 1 2 3 4 5 6 7 8 9 10

no pain worst pain possible

9. Select the number which indicates the average amount of pain felt over the PAST WEEK in your most painful osteoarthritic joint, when you are walking.

0 1 2 3 4 5 6 7 8 9 10

no pain worst pain possible

10. Do you believe exercise is beneficial for your osteoarthritis?

Strongly agree ☐ Agree ☐ Unsure ☐ Disagree ☐ Strongly disagree ☐

11. An exercise program prescribed by a physical therapist would improve my osteoarthritis.

Strongly agree ☐ Agree ☐ Unsure ☐ Disagree ☐ Strongly disagree ☐
12. Have you ever seen a physical therapist before?

☐ No

☐ Yes, for my osteoarthritis. If yes, please list the type of treatment you received.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

☐ Yes, for another health condition. If yes, please list the condition(s) and treatments received.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

13. Have you ever received any kind of health care (e.g. nurse advice, physical therapy, etc.) delivered over the telephone and/or via video over the internet for any health condition?

☐ No

☐ Yes, over the phone

☐ Yes, via video over the internet (e.g. Skype)

If yes, what kind of health problem was it for?

____________________________________________________________________

____________________________________________________________________

If known, what kind of health professional/s delivered the service/s to you? (please select all that apply)

☐ Nurse

☐ Physical therapist

☐ General practitioner

☐ Podiatrist

☐ Rheumatologist

☐ Orthopaedic surgeon

☐ Sports physician

☐ Chiropractor

☐ Occupational therapist
Appendix B

☐ Exercise physiologist / exercise instructor / personal trainer

☐ Osteopath

☐ Don’t know

☐ Other (please describe):

______________________________________________________________________

14. Which of the following devices do you currently own? (please select all that apply)
   ☐ Mobile phone
   ☐ Hand-held tablet/iPad
   ☐ Laptop/notebook computer
   ☐ Desktop computer

15. Which of your devices have internet access? (please select all that apply)
   ☐ Mobile phone
   ☐ Hand-held tablet/iPad
   ☐ Laptop/notebook computer
   ☐ Desktop computer

16. How often do you use a mobile phone? (please choose one)
   ☐ Never
   ☐ Once every few months
   ☐ Once a month
   ☐ Once a week
   ☐ Several times a week
   ☐ Every day

17. How confident are you with using a mobile phone? (please choose one)
   ☐ Not at all
   ☐ A little
   ☐ Moderately
18. How often do you use a computer? (please choose one)
   - Never
   - Once every few months
   - Once a month
   - Once a week
   - Several times a week
   - Every day

19. How confident are you with using a computer? (please choose one)
   - Not at all
   - A little
   - Moderately
   - Quite a bit
   - Extremely

20. How often do you use the internet (including browsing information, email and other online activities, and social media like Skype etc.)? (please choose one)
   - Never
   - Once every few months
   - Once a month
   - Once a week
   - Several times a week
   - Every day

21. How many years have you been using the internet for (including browsing information, email and other online activities and social media like Skype etc.)? (please choose one)
   - I have never used the internet
Less than 1 year
☐ 1-2 years
☐ 3-4 years
☐ 5-6 years
☐ More than 6 years

22. How would you rate your ability to use the internet (including browsing information, email and other online activities and social media like Skype etc.)? (please choose one)
☐ I have never used the internet
☐ Poor
☐ Fair
☐ Good
☐ Excellent

23. How confident would you be using video chat services over the internet, such as Skype? (please choose one)
☐ Not at all
☐ A little
☐ Moderately
☐ Quite a bit
☐ Extremely

PART B- TELEPHONE-DELIVERED SERVICES.
The next 17 items ask what you would think about having a physical therapist prescribe you an exercise program for your osteoarthritis over the telephone.

1. A physical therapist would get a good understanding of my osteoarthritis over the phone.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

2. My privacy would not be violated if the physical therapist prescribed me an exercise program over the phone.
3. Using the phone to consult the physical therapist for a prescribed exercise program would be easy for me.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

4. I would be as satisfied talking to the physical therapist over the phone as I would be talking to the physical therapist in person in their consulting room.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

5. An exercise program prescribed by a physical therapist over the phone would improve my osteoarthritis.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

6. An exercise program prescribed by a physical therapist over the phone would save me money.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

7. The physical therapist would be able to adequately monitor my osteoarthritis over the phone.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

8. I like that there would be no physical contact with the physical therapist prescribing me exercise over the phone.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

9. Having a physical therapist prescribe exercise over the phone would be a convenient form of healthcare for me.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree
10. Having a physical therapist prescribe exercise over the phone would save me time.

   Strongly agree  Agree  Unsure  Disagree  Strongly disagree

11. If there was a service offering physical therapist prescribed exercise over the phone for my osteoarthritis, I would be interested in using it.

   Strongly agree  Agree  Unsure  Disagree  Strongly disagree

12. If there was a service offering physical therapist prescribed exercise over the phone for my osteoarthritis, I would be willing to pay for it.

   Strongly agree  Agree  Unsure  Disagree  Strongly disagree

13. Using the phone would be an acceptable way to receive a physical therapist prescribed exercise program for my osteoarthritis.

   Strongly agree  Agree  Unsure  Disagree  Strongly disagree

14. Using the phone would be a useful (practical) way to receive a physical therapist prescribed exercise program for my osteoarthritis.

   Strongly agree  Agree  Unsure  Disagree  Strongly disagree

15. Using the phone would be an effective way to receive a physical therapist prescribed exercise program for my osteoarthritis.

   Strongly agree  Agree  Unsure  Disagree  Strongly disagree

16. Using the phone would be an affordable way to receive a physical therapist prescribed exercise program for my osteoarthritis.

   Strongly agree  Agree  Unsure  Disagree  Strongly disagree
17. Using the phone would be a safe way to receive a physical therapist prescribed exercise program for my osteoarthritis.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PART C - VIDEO CHAT SERVICES OVER THE INTERNET.
The next 17 items ask what you would think about having a physical therapist prescribe you an exercise program via video over the internet. This would involve the use of a computer or iPad/tablet and a program such as Skype or FaceTime, where you would be able to see as well as speak to the physical therapist. You would be in a place convenient to you (such as your own home) and the physical therapist would be based remotely in their consulting rooms.

1. A physical therapist would get a good understanding of my osteoarthritis via video over the internet.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. My privacy would not be violated if the physical therapist prescribed me an exercise program via video over the internet.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Using video over the internet to consult the physical therapist for a prescribed exercise program would be easy for me.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. I would be as satisfied talking to the physical therapist via video over the internet as I would be talking to the physiotherapist (physical therapist) in their consulting room.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. An exercise program prescribed by a physical therapist via video over the internet would improve my osteoarthritis.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. An exercise program prescribed by a physical therapist via video over the internet would save me money.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

7. The physical therapist would be able to adequately monitor my osteoarthritis via video over the internet.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

8. I like that there would be no physical contact with the physical therapist prescribing me exercise via video over the internet.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

9. Having a physical therapist prescribe exercise via video over the internet would be a convenient form of healthcare for me.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

10. Having a physical therapist prescribe exercise via video over the internet would save me time.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

11. If there was a service offering physical therapist prescribed exercise via video over the internet for my osteoarthritis, I would be interested in using it.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

12. If there was a service offering physical therapist prescribed exercise via video over the internet for my osteoarthritis, I would be willing to pay for it.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

13. Using video over the internet would be an acceptable way to receive a physical therapist prescribed exercise program for my osteoarthritis.
<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Using <em>video over the internet</em> would be a <strong>useful</strong> (<strong>practical</strong>) way to receive a physical therapist prescribed exercise program for my osteoarthritis.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Unsure</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>15. Using <em>video over the internet</em> would be an <strong>effective</strong> way to receive a physical therapist prescribed exercise program for my osteoarthritis.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Unsure</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>16. Using <em>video over the internet</em> would be an <strong>affordable</strong> way to receive a physical therapist prescribed exercise program for my osteoarthritis.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Unsure</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>17. Using <em>video over the internet</em> would be a <strong>safe</strong> way to receive a physical therapist prescribed exercise program for my osteoarthritis.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Unsure</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>
Appendix C: Copyright permission for Chapter 4
Appendix C

Terms and Conditions

- The materials you have requested permission to reproduce or reuse (the "Wiley Materials") are protected by copyright.

- You are hereby granted a personal, non-exclusive, non-sub licensable (on a stand-alone basis), non-transferable, worldwide, limited license to reproduce the Wiley Materials for the purpose specified in the licensing process. This license, and any CONTENT (PDF or image file) purchased as part of your order, is for a one-time use only and limited to any maximum distribution number specified in the license. The first instance of republication or reuse granted by this license must be completed within two years of the date of the grant of this license (although copies prepared before the end date may be distributed thereafter). The Wiley Materials shall not be used in any other manner or for any other purpose, beyond what is granted in the license. Permission is granted subject to an appropriate acknowledgement given to the author, title of the material/book/journal, and the publisher. You shall also duplicate the copyright notice that appears in the Wiley publication in your use of the Wiley Material. Permission is also granted on the understanding that nowhere in the text is a previously published source acknowledged for all or part of this Wiley Material. Any third party content is expressly excluded from this permission.

- With respect to the Wiley Materials, all rights are reserved. Except as expressly granted by the terms of the license, no part of the Wiley Materials may be copied, modified, adapted (except for minor reformatting required by the new Publication), translated, reproduced, transferred or distributed, in any form or by any means, and no derivative works may be made based on the Wiley Materials without the prior permission of the respective copyright owner. For STM Signatory Publishers clearing permission under the terms of the STM Permissions Guidelines, only, the terms of the license are extended to include subsequent editions and for editions in other languages, provided such editions are for the work as a whole in situ and do not involve the separate exploitation of the permitted figure or extracts. You may not alter, remove or suppress in any manner any copyright, trademark or other notices displayed by the Wiley Materials. You may not license, rent, sell, loan, lease, pledge, offer as security, transfer or assign the Wiley Materials on a stand-alone basis, or any of the rights granted to you hereunder to any other person.

- The Wiley Materials and all of the intellectual property rights therein shall at all times remain the exclusive property of John Wiley & Sons Inc, the Wiley Companies, or their respective licensors, and your interest therein is only that of having possession of and the right to reproduce the Wiley Materials pursuant to Section 2 herein during the continuance of this Agreement. You agree that you own no right, title or interest in or to the Wiley Materials or any of the intellectual property rights therein. You shall have no rights hereunder other than the license as provided for above in Section 2. No right, license or interest to any trademark, trade name, service mark or other branding (“Marks”) of WILEY or its licensors is granted hereunder, and you agree that you shall not assert any such right, license or interest with respect thereto.

- NEITHER WILEY NOR ITS LICENSORS MAKES ANY WARRANTY OR REPRESENTATION OF ANY KIND TO YOU OR ANY THIRD PARTY, EXPRESS, IMPLIED OR STATUTORY, WITH RESPECT TO THE MATERIALS OR THE ACCURACY OF ANY INFORMATION CONTAINED IN THE MATERIALS, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, ACCURACY, SATISFACTORY QUALITY, FITNESS FOR A PARTICULAR PURPOSE, USABILITY, INTEGRATION OR NON-INFRINGEMENT AND ALL SUCH WARRANTIES ARE HEREBY EXCLUDED BY WILEY AND ITS LICENSORS AND WAIVED BY YOU.
Appendix C

- WILEY shall have the right to terminate this Agreement immediately upon breach of this Agreement by you.

- You shall indemnify, defend and hold harmless WILEY, its Licensors and their respective directors, officers, agents and employees, from and against any actual or threatened claims, demands, causes of action or proceedings arising from any breach of this Agreement by you.

- IN NO EVENT SHALL WILEY OR ITS LICENSOR BE LIABLE TO YOU OR ANY OTHER PARTY OR ANY OTHER PERSON OR ENTITY FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, INDIRECT, EXEMPLARY OR PUNITIVE DAMAGES, HOWEVER CAUSED, ARISING OUT OF OR IN CONNECTION WITH THE DOWNLOADING, PROVISIONING, VIEWING OR USE OF THE MATERIALS REGARDLESS OF THE FORM OF ACTION, WHETHER FOR BREACH OF CONTRACT, BREACH OF WARRANTY, TORT, NEGLIGENCE, INFRINGEMENT OR OTHERWISE (INCLUDING WITHOUT LIMITATION, DAMAGES BASED ON LOSS OF PROFITS, DATA, FILES, USE, BUSINESS OPPORTUNITY OR CLAIMS OF THIRD PARTIES), AND WHETHER OR NOT THE PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THIS LIMITATION SHALL APPLY NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY PROVIDED HEREIN.

- Should any provision of this Agreement be held by a court of competent jurisdiction to be illegal, invalid, or unenforceable, that provision shall be deemed amended to achieve as nearly as possible the same economic effect as the original provision, and the legality, validity and enforceability of the remaining provisions of this Agreement shall not be affected or impaired thereby.

- The failure of either party to enforce any term or condition of this Agreement shall not constitute a waiver of either party’s right to enforce each and every term and condition of this Agreement. No breach under this agreement shall be deemed waived or excused by either party unless such waiver or consent is in writing signed by the party granting such waiver or consent. The waiver by or consent of a party to a breach of any provision of this Agreement shall not operate or be construed as a waiver of or consent to any other or subsequent breach by such other party.

- This Agreement may not be assigned (including by operation of law or otherwise) by you without WILEY’s prior written consent.

- Any fee required for this permission shall be non-refundable after thirty (30) days from receipt by the CCC.

- These terms and conditions together with CCC’s Billing and Payment terms and conditions (which are incorporated herein) form the entire agreement between you and WILEY concerning this licensing transaction and (in the absence of fraud) supersedes all prior agreements and representations of the parties, oral or written. This Agreement may not be amended except in writing signed by both parties. This Agreement shall be binding upon and inure to the benefit of the parties’ successors, legal representatives, and authorized assigns.

- In the event of any conflict between your obligations established by these terms and conditions and those established by CCC’s Billing and Payment terms and conditions, these terms and conditions shall prevail.

- WILEY expressly reserves all rights not specifically granted in the combination of (i) the license details provided by you and accepted in the course of this licensing
transaction. (ii) these terms and conditions and (iii) CCC's Billing and Payment terms and conditions.

- This Agreement will be void if the Type of Use, Format, Circulation, or Requestor Type was misrepresented during the licensing process.

- This Agreement shall be governed by and construed in accordance with the laws of the State of New York, USA, without regards to such state's conflict of law rules. Any legal action, suit or proceeding arising out of or relating to these Terms and Conditions or the breach thereof shall be instituted in a court of competent jurisdiction in New York County in the State of New York in the United States of America and each party hereby consents and submits to the personal jurisdiction of such court, waives any objection to venue in such court and consents to service of process by registered or certified mail, return receipt requested, at the last known address of such party.

WILEY OPEN ACCESS TERMS AND CONDITIONS

Wiley Publishes Open Access Articles in fully Open Access Journals and in Subscription journals offering Online Open. Although most of the fully Open Access journals publish open access articles under the terms of the Creative Commons Attribution (CC BY) License only, the subscription journals and a few of the Open Access Journals offer a choice of Creative Commons Licenses. The license type is clearly identified on the article.

The Creative Commons Attribution License (CC BY)

The Creative Commons Attribution License (CC BY) allows users to copy, distribute and transmit an article, adapt the article and make commercial use of the article. The CC-BY license permits commercial and non-commercial use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes. (see below)

Creative Commons Attribution Non-Commercial License

The Creative Commons Attribution Non-Commercial (CC-BY-NC) License permits use, distribution and reproduction in any medium, provided the original work is properly cited, is not used for commercial purposes and no modifications or adaptations are made. (see below)

Use by commercial "for-profit" organizations

Use of Wiley Open Access articles for commercial, promotional, or marketing purposes requires further explicit permission from Wiley and will be subject to a fee. Further details can be found on Wiley Online Library


Other Terms and Conditions:

v1.10 Last updated September 2015

Questions? customerscare@wiley.com or +1-855-239-3415 (toll free in the US) or +1-978-646-2777.
Appendix D: Physiotherapist telerehabilitation survey – Chapter 4

PART A- GENERAL QUESTIONS.

2) Are you…….
   ○ Female
   ○ Male

3) In which year were you qualified as a physiotherapist?

4) Do you have any postgraduate qualifications?
   ○ No
   ○ Yes, please specify:

5) Do you work... (Please select one option only)
   ○ Exclusively in the public health system
   ○ Exclusively in private health settings
   ○ In a combination of public health and non-public health settings
   ○ Other:

6) How many hours per week on average are you engaged in clinical physiotherapy practice?

7) What is the main focus of your clinical physiotherapy work? (Please select one option only)
   ○ Musculoskeletal outpatients
   ○ Musculoskeletal inpatients
   ○ Both musculoskeletal outpatients and inpatients
   ○ Neurological patients
   ○ Other (please specify):
8) **What is the geographical location of your clinical practice?** (Please select **one option only**)
   - Metropolitan city (population of \(\geq 250,000\))
   - Regional city/town (population of 18,000 to 249,999)
   - Rural town (population of 5,000 to 17,999)
   - Remote town (population of < 5,000)

9) **How frequently do you treat patients over 45 years old for their chronic knee/hip pain/osteoarthritis?** (Please select **one option only**)
   - Infrequently; at most 1 in the last 6 months
   - Somewhat frequently; between 2 and 5 in the last 6 months
   - Frequently; at least 1 per month
   - Very frequently; at least 1 per week

10) **Do you believe exercise is beneficial for osteoarthritis?**
    - Strongly agree
    - Agree
    - Unsure
    - Disagree
    - Strongly disagree

11) **How frequently do you prescribe an exercise program to patients with knee and/or hip osteoarthritis?** (Please choose **one option only**)
    - Never
    - Occasionally - to a minority of patients with knee/hip osteoarthritis
    - To approximately 50% of patients with knee/hip osteoarthritis
    - Usually - to most patients with knee/hip osteoarthritis
    - Always - to all patients with knee/hip osteoarthritis

12) **Have you ever delivered physiotherapy care for any health condition over the phone and/or via video over the internet?** (Please select **all that apply**)
   - No
   - Yes, over the phone. If yes, please specify the health condition you were managing:
   - Yes, via video over the internet (e.g. Skype). If yes, please specify the health condition you were managing:

13) **How confident would you be using video chat services over the internet, such as Skype?** (Please choose **one option only**)

14) Do you currently offer physiotherapy care over the phone for any patient group?
   - No
   - Yes. Please specify the patient groups/services you are delivering:

15) How many patients per month do you consult over the phone?

16) Do you currently offer physiotherapy care via video over the internet for any patient group?
   - No
   - Yes. Please specify the patient groups/services you are delivering:

17) How many patients per month do you consult via video over the internet?

PART B - TELEPHONE-DELIVERED SERVICES.

18) I would get a good understanding of a patient's osteoarthritis over the phone.
   - Strongly agree
   - Agree
   - Unsure
   - Disagree
   - Strongly disagree

19) A patient's privacy would not be violated if I prescribed them an exercise program over the phone.
   - Strongly agree
   - Agree
   - Unsure
   - Disagree
   - Strongly disagree

20) Using the phone to consult with an osteoarthritis patient and prescribe an exercise program would be easy for me.
Appendix D

☐ Strongly agree  ☐ Agree  ☐ Unsure  ☐ Disagree  ☐ Strongly disagree

21) I would be as satisfied talking to an osteoarthritis patient over the phone as I would be talking to the patient in-person in my consulting room.
   ☐ Strongly agree  ☐ Agree  ☐ Unsure  ☐ Disagree  ☐ Strongly disagree

22) An exercise program prescribed by a physiotherapist over the phone would improve a patient's osteoarthritis.
   ☐ Strongly agree  ☐ Agree  ☐ Unsure  ☐ Disagree  ☐ Strongly disagree

23) An exercise program prescribed by a physiotherapist over the phone would save a patient money.
   ☐ Strongly agree  ☐ Agree  ☐ Unsure  ☐ Disagree  ☐ Strongly disagree

24) I would be able to adequately monitor a patient's osteoarthritis over the phone.
   ☐ Strongly agree  ☐ Agree  ☐ Unsure  ☐ Disagree  ☐ Strongly disagree

25) I like that there would be no physical contact with an osteoarthritis patient when consulting over the phone.
   ☐ Strongly agree  ☐ Agree  ☐ Unsure  ☐ Disagree  ☐ Strongly disagree

26) Receiving an exercise program from a physiotherapist over the phone would be a convenient form of healthcare for an osteoarthritis patient.
   ☐ Strongly agree  ☐ Agree  ☐ Unsure  ☐ Disagree  ☐ Strongly disagree

27) Receiving an exercise program from a physiotherapist over the phone would save the patient time.
   ☐ Strongly agree  ☐ Agree  ☐ Unsure  ☐ Disagree  ☐ Strongly disagree

28) A session of physiotherapist-prescribed exercise over the phone for people with osteoarthritis should cost patients...
   ☐ 50% more than the cost of a face-to-face physiotherapy session
   ☐ 25% more than the cost of a face-to-face physiotherapy session
The same cost as a face-to-face physiotherapy session
25% less than the cost of a face-to-face physiotherapy session
50% less than the cost of a face-to-face physiotherapy session

29) I would be interested in being involved in a service offering physiotherapist-prescribed exercise over the phone for people with osteoarthritis.
   ○ Strongly agree  ○ Agree  ○ Unsure  ○ Disagree  ○ Strongly disagree

30) Using the phone would be an acceptable way for me to deliver an exercise program to patients with osteoarthritis.
   ○ Strongly agree  ○ Agree  ○ Unsure  ○ Disagree  ○ Strongly disagree

31) Using the phone would be a useful (practical) way for me to deliver an exercise program to patients with osteoarthritis.
   ○ Strongly agree  ○ Agree  ○ Unsure  ○ Disagree  ○ Strongly disagree

32) Using the phone would be an effective way for me to deliver an exercise program to patients with osteoarthritis.
   ○ Strongly agree  ○ Agree  ○ Unsure  ○ Disagree  ○ Strongly disagree

33) Using the phone would be an affordable way for patients to receive a physiotherapist-prescribed exercise program for their osteoarthritis.
   ○ Strongly agree  ○ Agree  ○ Unsure  ○ Disagree  ○ Strongly disagree

34) Using the phone would be a safe way for patients to receive a physiotherapist-prescribed exercise program for their osteoarthritis.
   ○ Strongly agree  ○ Agree  ○ Unsure  ○ Disagree  ○ Strongly disagree

PART C - VIDEO CHAT SERVICES OVER THE INTERNET.

35) I would get a good understanding of a patient's osteoarthritis via video over the internet.
   ○ Strongly agree  ○ Agree  ○ Unsure  ○ Disagree  ○ Strongly disagree
36) A patient's privacy would not be violated if I prescribed them an exercise program via video over the internet.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

37) Using video over the internet to consult with an osteoarthritis patient and prescribe an exercise program would be easy for me.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

38) I would be as satisfied talking to an osteoarthritis patient via video over the internet as I would be talking to the patient in-person in my consulting room.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

39) An exercise program prescribed by a physiotherapist via video over the internet would improve a patient's osteoarthritis.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

40) An exercise program prescribed by a physiotherapist via video over the internet would save a patient money.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

41) I would be able to adequately monitor a patient's osteoarthritis via video over the internet.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

42) I like that there would be no physical contact with an osteoarthritis patient when consulting via video over the internet.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

43) Receiving an exercise program from a physiotherapist via video over the internet would be a convenient form of healthcare for an osteoarthritis patient.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree
Appendix D

44) Receiving an exercise program from a physiotherapist via video over the internet would save the patient time.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

45) A session of physiotherapist-prescribed exercise via video over the internet for people with osteoarthritis should cost patients...

- 50% more than the cost of a face-to-face physiotherapy session
- 25% more than the cost of a face-to-face physiotherapy session
- The same cost as a face-to-face physiotherapy session
- 25% less than the cost of a face-to-face physiotherapy session
- 50% less than the cost of a face-to-face physiotherapy session

46) I would be interested in being involved in a service offering physiotherapist-prescribed exercise via video over the internet for people with osteoarthritis.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

47) Using video over the internet would be an acceptable way for me to deliver an exercise program to patients with osteoarthritis.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

48) Using video over the internet would be a useful (practical) way for me to deliver an exercise program to patients with osteoarthritis.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

49) Using video over the internet would be an effective way for me to deliver an exercise program to patients with osteoarthritis.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

50) Using video over the internet would be an affordable way for patients to receive a physiotherapist-prescribed exercise program for their osteoarthritis.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

51) Using video over the internet would be a safe way for patients to receive a physiotherapist-prescribed exercise program for their osteoarthritis.
Appendix D

☐ Strongly agree
    disagree
☐ Agree
☐ Unsure
☐ Disagree
☐ Strongly disagree
Appendix E: Copyright permission for Chapter 6

<table>
<thead>
<tr>
<th>License Number</th>
<th>4322351250097</th>
</tr>
</thead>
<tbody>
<tr>
<td>License date</td>
<td>Apr 05, 2018</td>
</tr>
<tr>
<td>Licensed Content Publisher</td>
<td>John Wiley and Sons</td>
</tr>
<tr>
<td>Licensed Content Title</td>
<td>Training Physical Therapists in Person-Centered Practice for People With Osteoarthritis: A Qualitative Case Study</td>
</tr>
<tr>
<td>Licensed Content Author</td>
<td>Helinda J. Lawford, Clare Delaney, Kim L. Bannall, et al</td>
</tr>
<tr>
<td>Licensed Content Date</td>
<td>Feb 26, 2010</td>
</tr>
<tr>
<td>Licensed Content Volume</td>
<td>70</td>
</tr>
<tr>
<td>Licensed Content Issue</td>
<td>4</td>
</tr>
<tr>
<td>Licensed Content Pages</td>
<td>13</td>
</tr>
<tr>
<td>Type of use</td>
<td>Dissertation/Thesis</td>
</tr>
<tr>
<td>Requestor type</td>
<td>Author of this Wiley article</td>
</tr>
<tr>
<td>Format</td>
<td>Print and electronic</td>
</tr>
<tr>
<td>Portion</td>
<td>Full article</td>
</tr>
<tr>
<td>Will you be translating?</td>
<td>No</td>
</tr>
<tr>
<td>Title of your thesis / dissertation</td>
<td>Exploring remote models of physiotherapy service delivery for people with osteoarthritis</td>
</tr>
<tr>
<td>Expected completion date</td>
<td>Apr 2010</td>
</tr>
<tr>
<td>Expected size (number of pages)</td>
<td>300</td>
</tr>
<tr>
<td>Requestor Location</td>
<td>Ms. Belinda Lawford</td>
</tr>
<tr>
<td></td>
<td>455 Swingler Rd</td>
</tr>
<tr>
<td></td>
<td>Invermay, Victoria 3352 Australia</td>
</tr>
<tr>
<td></td>
<td>Attn: Ms. Belinda Lawford</td>
</tr>
</tbody>
</table>

Publisher Tax ID: EU025007151

Total: 0.00 AUD

**TERMS AND CONDITIONS**

This copyrighted material is owned by or exclusively licensed to John Wiley & Sons, Inc. or one of its group companies (each a "Wiley Company") or handled on behalf of a society with which a Wiley Company has exclusive publishing rights in relation to a particular work (collectively, "WILEY"). By clicking "accept" in connection with completing this licensing transaction, you agree that the following terms and conditions apply to this transaction (along with the billing and payment terms and conditions established by the Copyright Clearance Center Inc., "CCC’s Billing and Payment terms and conditions"). At the time that you opened your RightsLink account (these are available at any time at [http://www.rightslink.com](http://www.rightslink.com)).

https://s100.copyright.com/AppDispatchSmtNet
Appendix E

Terms and Conditions

- The materials you have requested permission to reproduce or reuse (the "Wiley Materials") are protected by copyright.

- You are hereby granted a personal, non-exclusive, non-sub licensable (on a stand-alone basis), non-transferable, worldwide, limited license to reproduce the Wiley Materials for the purpose specified in the licensing process. This license, and any CONTENT (PDF or image file) purchased as part of your order, is for a one-time use only and limited to any maximum distribution number specified in the license. The first instance of reproduction or reuse granted by this license must be completed within two years of the date of the grant of this license (although copies prepared before the end date may be distributed thereafter). The Wiley Materials shall not be used in any other manner or for any other purpose, beyond what is granted in the license. Permission is granted subject to an appropriate acknowledgement given to the author, title of the material/book/journal and the publisher. You shall also duplicate the copyright notice that appears in the Wiley publication in your use of the Wiley Material. Permission is also granted on the understanding that nowhere in the text is a previously published source acknowledged for all or part of this Wiley Material. Any third party content is expressly excluded from this permission.

- With respect to the Wiley Materials, all rights are reserved. Except as expressly granted by the terms of the license, no part of the Wiley Materials may be copied, modified, adapted (except for minor reformatting required by the new publisher), translated, reproduced, transferred or distributed, in any form or by any means, and no derivative works may be made based on the Wiley Materials without the prior permission of the respective copyright owner. For STM Signatory Publishers clearing permission under the terms of the STM Permissions Guidelines only, the terms of the license are extended to include subsequent editions and for editions in other languages, provided such editions are for the work as a whole in situ and do not involve the separate exploitation of the permitted figures or extracts. You may not alter, remove or suppress in any manner any copyright, trademark or other notices displayed by the Wiley Materials. You may not license, rent, sell, loan, lease, pledge, offer as security, transfer or assign the Wiley Materials on a stand-alone basis, or any of the rights granted to you hereunder to any other person.

- The Wiley Materials and all of the intellectual property rights therein shall at all times remain the exclusive property of John Wiley & Sons Inc., the Wiley Companies, or their respective licensors, and your interest therein is only that of having possession of and the right to reproduce the Wiley Materials pursuant to Section 2 hereof during the continuance of this Agreement. You agree that you own no right, title or interest in or to the Wiley Materials or any of the intellectual property rights therein. You shall have no rights hereunder other than the license as provided for above in Section 2. No right, license or interest to any trademark, trade name, service mark or other branding ("Marks") of WILEY or its licensors is granted hereunder, and you agree that you shall not assert any such right, license or interest with respect thereto.

- NEITHER WILEY NOR ITS LICENSORS MAKES ANY WARRANTY OR REPRESENTATION OF ANY KIND TO YOU OR ANY THIRD PARTY EXPRESS, IMPLIED OR STATUTORY, WITH RESPECT TO THE MATERIALS OR THE ACCURACY OF ANY INFORMATION CONTAINED IN THE MATERIALS, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, ACCURACY, SATISFACTORY QUALITY, FITNESS FOR A PARTICULAR PURPOSE, USABILITY, INTEGRATION OR NON-INFRINGEMENT AND ALL SUCH WARRANTIES ARE HEREBY EXCLUDED BY WILEY AND ITS LICENSORS AND WAIVED BY YOU.

https://onlinelibrary.wiley.com/doi/10.1002/9781118383887.app1
Appendix E

- WILEY shall have the right to terminate this Agreement immediately upon breach of this Agreement by you.

- You shall indemnify, defend and hold harmless WILEY, its Licensors and their respective directors, officers, agents and employees, from and against any actual or threatened claims, demands, causes of action or proceedings arising from any breach of this Agreement by you.

- IN NO EVENT SHALL WILEY OR ITS LICENSORS BE LIABLE TO YOU OR ANY OTHER PARTY OR ANY OTHER PERSON OR ENTITY FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, INDIRECT, EXEMPLARY OR PUNITIVE DAMAGES, HOWEVER CAUSED, ARISING OUT OF OR IN CONNECTION WITH THE DOWNLOADING, PROVISIONING, VIEWING OR USE OF THE MATERIALS REGARDLESS OF THE FORM OF ACTION, WHETHER FOR BREACH OF CONTRACT, BREACH OF WARRANTY, TORT, NEGLIGENCE, INFRINGEMENT OR OTHERWISE (INCLUDING, WITHOUT LIMITATION, DAMAGES BASED ON LOSS OF PROFITS, DATA, FILES, USE, BUSINESS OPPORTUNITY OR CLAIMS OF THIRD PARTIES), AND WHETHER OR NOT THE PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THIS LIMITATION SHALL APPLY NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY PROVIDED HEREIN.

- Should any provision of this Agreement be held by a court of competent jurisdiction to be illegal, invalid, or unenforceable, that provision shall be deemed amended to achieve as nearly as possible the same economic effect as the original provision, and the legality, validity and enforceability of the remaining provisions of this Agreement shall not be affected or impaired thereby.

- The failure of either party to enforce any term or condition of this Agreement shall not constitute a waiver of either party's right to enforce each and every term and condition of this Agreement. No breach under this agreement shall be deemed waived or excused by either party unless such waiver or consent is in writing signed by the party granting such waiver or consent. The waiver by or consent of a party to a breach of any provision of this Agreement shall not operate or be construed as a waiver of or consent to any other or subsequent breach by such other party.

- This Agreement may not be assigned (including by operation of law or otherwise) by you without WILEY's prior written consent.

- Any fee required for this permission shall be non-refundable after thirty (30) days from receipt by the CCC.

- These terms and conditions together with CCC's Billing and Payment terms and conditions (which are incorporated herein) form the entire agreement between you and WILEY concerning this licensing transaction and (in the absence of fraud) supersedes all prior agreements and representations of the parties, oral or written. This Agreement may not be amended except in writing signed by both parties. This Agreement shall be binding upon and inure to the benefit of the parties’ successors, legal representatives, and authorized assigns.

- In the event of any conflict between your obligations established by these terms and conditions and those established by CCC's Billing and Payment terms and conditions, these terms and conditions shall prevail.

- WILEY expressly reserves all rights not specifically granted in the combination of (i) the license details provided by you and accepted in the course of this licensing
transaction, (ii) these terms and conditions and (iii) CCC’s Billing and Payment terms and conditions.

- This Agreement will be void if the Type of Use, Format, Circulation, or Requestor Type was misrepresented during the licensing process.

- This Agreement shall be governed by and construed in accordance with the laws of the State of New York, USA, without regards to such state’s conflict of law rules. Any legal action, suit or proceeding arising out of or relating to these Terms and Conditions or the breach thereof shall be instituted in a court of competent jurisdiction in New York County in the State of New York in the United States of America and each party hereby consents and submits to the personal jurisdiction of such court, waives any objection to venue in such court and consents to service of process by registered or certified mail, return receipt requested, at the last known address of such party.

WILEY OPEN ACCESS TERMS AND CONDITIONS
Wiley Publishes Open Access Articles in fully Open Access Journals and in Subscription journals offering Online Open. Although most of the fully Open Access journals publish open access articles under the terms of the Creative Commons Attribution (CC BY) License only, the subscription journals and a few of the Open Access Journals offer a choice of Creative Commons Licenses. The license type is clearly identified on the article.

The Creative Commons Attribution License
The Creative Commons Attribution License (CC-BY) allows users to copy, distribute and transmit an article, adapt the article and make commercial use of the article. The CC-BY license permits commercial and non-commercial uses.

The Creative Commons Attribution Non-Commercial License
The Creative Commons Attribution Non-Commercial (CC-BY-NC) License permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes. (see below)

Use by commercial "for-profit" organizations
Use of Wiley Open Access articles for commercial, promotional, or marketing purposes requires further explicit permission from Wiley and will be subject to a fee.

Further details can be found on Wiley Online Library:
http://olabout.wiley.com/WileyCDA/Section/id-410855.html

Other Terms and Conditions:

v1.10 Last updated September 2015

Questions? customercare@copyright.com or +1-855-239-3415 (toll free in the US) or +1-978-040-2777.

https://s100.copyright.com/AppDispatch/Serif
Appendix F: Pre- and post-training semi-structured interview questions and prompts – Chapter 6

Pre-training

1. I’m interested in learning a bit about your usual communication style with your patients in clinical practice. Tell me a little bit about your typical communication style and the methods you use to build a relationship with your patients. **What sorts of things do you think help you develop a positive collaborative relationship with your patients?**

2. Can you tell me what you understand about ‘person-centred care’? What does person-centred care mean to you? **Can you give me an example of how your usual clinical practice is person-centred?**

3. Tell me about the strategies you currently use to promote patient self-management of OA and other chronic musculoskeletal conditions? **Can you give me an example of how your usual clinical practice is person-centred?**

4. Self-management of chronic conditions usually involves a long-term exercise program. Who do you think is responsible for ensuring that a person with a chronic condition adheres to their exercise program?

5. Finally, how confident are you feeling about delivering exercise counselling and advice to people with knee OA over the phone?

Post-training

1. How did you find the first two training days? **How did you find the first two training days?**
   *Was it what you expected?*  
   *Was there anything you found difficult to understand?*  
   *How did you feel straight after the first two training days, before you had your first pilot patient?*  
   *Did you listen back to your own audio recordings? If so, how did you find that?*  
   *How confident were you feeling after you’d finished with the pilot patients, before the final training day?*

2. Can you tell me about the session with the pilot patients - was it useful for you to practice using the skills you’d learnt?  
   *Did the session help with any of the problems/issues/questions you’d noted at the start of the session? Was there anything you still found difficult/confusing/unsure about?*

3. How did you find the final training day?  
   *How did you feel about the group feedback from the training facilitator?*  
   *Did the session help with any of the problems/issues/questions you’d noted at the start of the session? Was there anything you still found difficult/confusing/unsure about?*  
   *How prepared do you feel right now to deliver the intervention for the clinical trial?*  
   *Is there anything you feel apprehensive about?*  
   *In our first interview, you said you were….. [refer to response to Q5 in pre-training interview] about delivering the intervention, how are you feeling now?*

4. I’m also interested to know whether the training has impacted in any way on how you manage/interact with your other patients- outside of the pilot patients you were provided? **Are there any techniques or methods you wouldn’t want to use in your usual practice? Why?**

5. I asked you this in your first interview and am interested in your thoughts now that you’ve completed training. What’s your understanding or ideas about person-centred care? **Do you think your understanding of person-centred care changed after doing the training?**

6. Last time you said that….. [refer to response to Q4 in pre-training interview]. Now that you’ve completed training and practiced with a few pilot patients, what are your thoughts now on the role of the physio in promoting exercise adherence?

8. Do you think your undergraduate physiotherapy training provided you with the knowledge and skills to support your patients in behaviour change?
Appendix G: Consultation audit form – Chapter 7

Practice Principles & Essential Techniques (PPET) Skills Audit Form

Person-Centred Practice Principles

Rate yourself on the extent to which you already use the following practice principles effectively in your work with clients, patients or staff (depending on your role). The scales are from 0 (I need to work on this principle) to 10 (I am doing really well with this principle). Circle the appropriate number.

a. Use a person-centred approach that promotes a person’s choice and control

0........1........2........3........4........5........6........7........8........9........10
I need to work on this I am doing really well

b. Use the call it as you see it principle to tactfully highlight contradictions in a person’s behaviour

0........1........2........3........4........5........6........7........8........9........10
I need to work on this I am doing really well

c. Address all four aspects of goal setting when discussing and setting goals with a person

0........1........2........3........4........5........6........7........8........9........10
I need to work on this I am doing really well

d. Give people permission to focus on one thing at a time, one step at a time, adding up over time

0........1........2........3........4........5........6........7........8........9........10
I need to work on this I am doing really well

f. Use the RICK Principle to consider a person’s motivation for taking action

0........1........2........3........4........5........6........7........8........9........10
I need to work on this I am doing really well

g. First ask a person for their input or permission before offering advice or asking for information

0........1........2........3........4........5........6........7........8........9........10
I need to work on this I am doing really well

©2015 HealthChange® Australia
Appendix G

h. Use the wait till # technique to allow people time to think and respond to questions

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>I need to work on this</td>
<td>I am doing really well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

i. Invite the client (or other person) to write any information or tasks that they need to remember later

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>I need to work on this</td>
<td>I am doing really well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

j. Encourage a trial and error approach when helping a person to change their daily habits

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>I need to work on this</td>
<td>I am doing really well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Essential Behaviour Change Techniques

Tick the column that best describes your level of skill in using each of the techniques in the table below.

<table>
<thead>
<tr>
<th>Essential Technique</th>
<th>I am already using this technique effectively</th>
<th>I need to improve my skill level in using this technique</th>
<th>I need to learn how to apply this technique</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Client first</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Menu of options</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. RICk radar (Intuition)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Ask RICk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. RICK-focused decisional balance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Changing thinking habits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Tracking and monitoring strategies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

©2015 HealthChange® Australia
Appendix H: Copyright permission for Chapter 8
Author/s: Lawford, Belinda

Title: Exploring remote models of physiotherapy service delivery for people with osteoarthritis

Date: 2018

Persistent Link: http://hdl.handle.net/11343/213835

File Description: Thesis

Terms and Conditions: Copyright in works deposited in Minerva Access is retained by the copyright owner. The work may not be altered without permission from the copyright owner. Readers may only download, print and save electronic copies of whole works for their own personal non-commercial use. Any use that exceeds these limits requires permission from the copyright owner. Attribution is essential when quoting or paraphrasing from these works.