

## Original article

# Self-management behaviour after a physiotherapist guided blended self-management intervention in patients with chronic low back pain: A qualitative study

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## ABSTRACT

**Background:** Self-management support is considered an important component in the physiotherapeutic treatment of people with chronic low back pain. The stratified blended physiotherapy intervention e-Exercise Low Back Pain is an example of a self-management intervention. More insight may contribute to improving blended interventions to stimulate self-management after treatment and thus hopefully prevent chronicity and/or relapses in patients with chronic low back pain.

**Objectives:** The aim of this study was to gain an in-depth understanding of the self-management behaviour after a physiotherapist guided blended self-management intervention in people with chronic low back pain.

**Design:** A qualitative study with semi-structured interviews nested within a randomized controlled trial on the (cost-)effectiveness of e-Exercise Low Back Pain was conducted.

**Method:** Thematic analysis was used to analyse the transcriptions. A hybrid process of both deductive and inductive approaches was used.

**Results:** After 12 interviews, data saturation was reached. Analysis of the data yielded six themes related to self-management behaviour: illness beliefs, coping, cognitions, social support and resource utilization, physiotherapeutic involvement and motivation.

**Conclusions:** In our study the majority of the participants seemed to show adequate self-management behaviour when experiencing low back pain. Most participants first try to gain control over their low back pain themselves when experiencing a relapse before contacting the physiotherapist. Participants struggle in continuing health behaviour in pain free periods between relapses of low back pain. Physiotherapists are recommended to encourage long-term behaviour change. Additionally, better facilitation by the physiotherapist or additional functionalities in the app to stimulate social support might have a useful contribution.

## 1. Introduction

Low back pain (LBP) is a major health problem and contributes to a significant economic burden (Hartvigsen et al., 2018; Vos et al., 2016; March et al., 2014). Of the patients who visit the primary care physiotherapist, 15% reports LBP (Kooijman et al., 2010; Staal et al., 2013). LBP can be caused by a specific pathology, however an underlying

condition is absent in more than 90% of the cases (Koes et al., 2006; Maher et al., 2017). The clinical course of this so-called 'non-specific LBP' varies; some people recover within a couple of days or weeks, but others (20–50%) experience persistent disabling symptoms leading to chronic LBP (duration >12 weeks) (Staal et al., 2013; NHG. NHG-Standaard Aspecifieke lagerugpijn, 2020) and more than half of patients with chronic LBP still experience LBP after one or two years

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(Hayden et al., 2010; Carey et al., 2000; Menezes Costa et al., 2009). Chronic LBP can manifest as constant pain or relapses with pain free episodes in between (da Silva et al., 2017). Patients with chronic LBP are often physically inactive and struggling with their self-management behaviour (Staal et al., 2013; NHG. NHG-Standaard Aspecifieke lagerugpijn, 2020; Leung, 2012; Andersson, 1997). These patients experience challenges in managing their condition and are in need of more self-management support by their healthcare provider (Lim et al., 2019; Cooper et al., 2009; May 2007; Liddle et al., 2007).

A common used definition of self-management is that of Barlow et al.: "Self-management is the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and life style changes inherent in living with a chronic condition." (Barlow et al., 2002). In addition, Lorig and Holman categorized self-management into: 1) problem solving, 2) decision making, 3) resource utilization, 4) formation of a patient-provider partnership, 5) action planning and 6) self-tailoring (Lorig and Holman, 2003). All these self-management skills are related the way someone copes with his or her condition. From a broader perspective, self-management support suits the current shift from attention on "care and disease" towards "health and behaviour", which is in line with current ideas on health, as the 'ability to adapt and to self-manage, in the face of social, physical and emotional challenges' (Huber et al., 2011).

Adequate self-management behaviour in patients with chronic LBP contributes to coping with their condition (Crowe et al., 2010; Du et al., 2017) and is essential for successful pain management and relapse prevention (Jung and Jeong, 2016). Therefore, national and international physiotherapy guidelines endorse the stimulation of self-management in these patients during and after termination of the treatment (Staal et al., 2017; NICE, 2016). Physiotherapists can promote self-management through education, exercise, behaviour change and promotion of a healthy lifestyle (Staal et al., 2013; NHG. NHG-Standaard Aspecifieke lagerugpijn, 2020). Additionally, an emerging phenomenon for promoting self-management is the use of eHealth, such as mobile apps (E-health, 2020). Two recent systematic reviews indicate that unguided digital interventions such as mobile apps could contribute positively to promote self-management in patients with chronic LBP (Nicholl et al., 2017; Machado et al., 2016). The integration of digital intervention within healthcare is seen as the best of both worlds and termed 'blended care' (Wentzel et al., 2016).

To date, little qualitative research has been done on patients' experiences with self-management behaviour in the period after a physiotherapist guided blended self-management intervention. Insight in these experiences can be used to improve blended self-management interventions and guidance of patients with chronic LBP. Therefore, the aim of this study was to gain an in-depth understanding of the self-management behaviour after a physiotherapist guided blended self-management intervention in people with chronic LBP.

## 2. Methods

### 2.1. Study design

A qualitative study with semi-structured interviews nested within a Randomized Controlled Trial (RCT) on the (cost-)effectiveness of e-Exercise LBP was conducted. In this blended intervention, patients have regular face-to-face sessions with a physiotherapist (Appendix 1) (Kloek et al., 2019). In addition, patients have access to an app which is connected to a physiotherapists' dashboard. The app contains personal physical activity assignments, exercises and informative texts and videos about LBP and self-management related topics (Over e, 2020; van Tilburg et al., 2020). Some examples of topics covered are: 'What is LBP?', 'Exercise and LBP' and 'Getting active, setting goals'. A RCT of the long-term (cost-)effectiveness of e-Exercise LBP is currently ongoing (Koppelaar et al., 2020). The first indications of a three months results study showed that this blended intervention is a valid alternative for

usual face-to-face physiotherapy (Koppelaar). This qualitative study fulfils the Consolidated Criteria for Reporting Qualitative Research (COREQ) (Tong et al., 2007) (Appendix II).

### 2.2. Participants

Recruitment was carried out within the participants of the ongoing e-Exercise LBP RCT (Koppelaar et al., 2020). Inclusion criteria for the RCT were: (i) being a patient requesting physiotherapy treatment for LBP, defined as pain in the lumbosacral region (sometimes associated with radiating pain to the buttock or leg) (Staal et al., 2017), (ii) age 18 years or older, (iii) possessing a smartphone or tablet with access to the internet, (iv) fluency in the Dutch language. Exclusion criteria for the RCT were: (i) a specific cause of LBP determined through medical imaging or a medical doctor (e.g., osteoporotic fractures, spinal nerve compromise, malignancy, ankylosing spondylitis, canal stenosis, or severe spondylolisthesis), (ii) serious comorbidities (e.g., malignancy, stroke), (iii) current pregnancy. Additional inclusion criteria for this qualitative study were: 1) being a participant from the intervention group of the e-Exercise LBP trial (Koppelaar et al., 2020), 2) experiencing chronic LBP (more than 12 weeks) at the start of the e-Exercise LBP trial and 3) having completed the 12 week e-Exercise LBP program between 12 and 24 months ago. Patients were contacted in order of inclusion in the RCT. Eligible participants were contacted by telephone to participate in the study and to arrange an interview. All participants received both written and verbal information about the study. Informed consent was signed prior to the interviews.

### 2.3. Data collection and procedure

The semi-structured interviews consisted of open-ended questions, which were broad in nature in order to elicit extensive responses from the participants (Creswell and Creswell, 2018). A topic guide ensured that the same areas were covered in each interview (Creswell and Creswell, 2018; van Nes, 2012). The topics have been formulated based on the model of Lorig and Holman (2003). A complete overview of the topics can be found in Appendix III. The topic guide as seen in Appendix III shows only a few questions to start the conversation, after which extensive questions were asked to create in-depth conversations. The order of the topics depended on the participants' responses. All interviews were executed by author JA, who pretested the topic guide in multiple pilot interviews with peer students, which led to further refinement. In view of the COVID-19 pandemic, the interviews were conducted by videocall with Microsoft Teams (Microsoft, 2020). Interviews were recorded and subsequently transcribed verbatim. This allowed to stop data collection after data saturation had occurred. Data saturation meant that no new information was presented in the last two interviews and no new categories had been formed from the codes. Prior to analysis, respondent validation was carried out to promote internal validity (Birt et al., 2016; Leung, 2015). Transcripts were returned to the participants, to verify for accuracy. Furthermore, an audit trail was maintained to provide insight into the method by which research data was obtained and processed (Leung, 2015; Carcary, 2009). To get insight in the composition of the sample, the following data was derived from the e-Exercise LBP RCT for each participant: gender, age, profession, educational level, duration of LBP, physical functioning (assessed by the Oswestry Disability Index (ODI), version 2.1a (Chiarotto et al., 2018; Fairbank and Pynsent, 1976)), patient activation (assessed by the Dutch version of the short form Patient Activation Measure (PAM 13-Dutch) (Hibbard et al., 2005; Rademakers et al., 2012)) and pain intensity (measured with an 11-point Numeric Rating Scale (NRS) (Chiarotto et al., 2018; Dworkin et al., 2008)).

### 2.4. Data-analysis

Rigour of analysis was enhanced by using thematic analysis (Braun

and Clarke, 2006; Fereday and Muir-Cochrane, 2006). The hybrid process consisted of both deductive and inductive approaches (Braun and Clarke, 2006; Fereday and Muir-Cochrane, 2006). After initial reading of the transcripts, inductive open codes were assigned independently by JA and CK for three transcripts (inductive approach). To promote reliability, codes were discussed until consensus had been reached (Creswell and Creswell, 2018). Subsequently, JA assigned codes to the remaining transcripts. Next, final codes were grouped into categories according to their relationship to one another and how they were linked to the data. The categories that emerged were then used to classify the data into themes. Lastly, themes from the inductive process were compared to the themes based on the model of Lorig and Holman (deductive approach). To prevent researcher bias and strengthen the internal validity, differences and similarities were discussed by JA and CK and resulted in a final set of themes (Creswell and Creswell, 2018). Furthermore, illustrative quotes were extracted. An independent native speaker translated the original Dutch quotes to English, in order to prevent translation bias. Demographics (gender, age, profession, educational level), disease characteristics (duration of LBP, currently experiencing LBP) and health status (ODI, PAM 13-Dutch, NRS) were analysed using descriptive statistics (count, mean, range) by IBM SPSS 27 (IBM. IBM SPSS Statistics 27, 2020). Qualitative data were analysed using Atlas. ti (version 8) (ti, 2020). Both JA and CK were trained in qualitative research methods.

2.5. Ethics

The e-Exercise LBP RCT, and an amendment for the purpose of this qualitative study, has been approved by the Medical Research Ethics Committee of the University Medical Center Utrecht, The Netherlands (ISRCTN 94074203).

3. Results

After 12 interviews, data saturation was reached. Participants (male: n = 7, female: n = 5) had a mean age of 54.1 years (range: 23–83) and completed the e-Exercise LBP program on average 18.8 months ago (range: 12–22). At the time of the interviews 71.4% of the participants were experiencing LBP. The duration of the interviews was approximately 30–45 min. Complete overview of demographics, disease characteristics and health status of the participants are presented in Table 1.

Table 1  
Demographics, disease characteristics and health status of participants.

Participant	Gender (M/F)	Age (years)	Profession	Educational level (low/middle/high)*	Duration of LBP at the start of the e-Exercise LBP trial (months)	Experiencing LBP at the time of the interview (yes/no)	Time between the completion of the 12-week e-Exercise LBP program and the interview (months)	ODI***	PAM***	NRS***
P1	F	83	Retired	Low	>12	Yes	12	28	75.0	8
P2	M	70	Retired	Middle	>12	Yes	12	2	51.0	3
P3	F	58	Work coach	Middle	>12	No	22	12	67.8	5
P4	M	70	Retired	High	3–12	Yes	13	6	60.0	6
P5	M	23	Lifeguard	Middle	3–12	No	22	8	67.8	7
P6	F	35	Photographer	Middle	>12	Yes	22	18	58.1	3
P7	M	42	Engineer	High	>12	No	22	8	65.5	3
P8	M	51	Account manager	High	3–12	No	18	42	58.1	6
P9	F	43	Catering manager	Middle	>12	Yes	22	26	48.9	7
P10	F	53	Financial advisor	Middle	>12	Yes	18	42	58.1	6
P11	M	52	Graphic designer	Middle	>12	Yes	22	8	45.3	5
P12	M	70	Retired	High	>12	No	21	26	72.5	8

Average values\*\*: 7M/5 F 54.1 (23–83) 18.8.

M = male; F = female; ODI=Oswestry Disability Index; PAM=Patient Activation Measurement; NRS=Numeric Rating Scale\*According to the Statistics Netherlands (CBS) (CBS. Educational level, 2021)\*\*Values are expressed as mean and range \*\*\*Variables are baseline data from the e-Exercise LBP RCT.

4. Themes

Six major themes based upon 12 categories were formulated (Hartvigsen et al., 2018): illness beliefs (Vos et al., 2016), coping (March et al., 2014), cognitions (Kooijman et al., 2010), social support and resource utilization (Staal et al., 2013), physiotherapeutic involvement and (Koes et al., 2006) motivation (Fig. 1). The themes may describe the overarching self-management behaviour and thus, may not always be seen as separate themes. Therefore, some quotes can belong to multiple themes.

4.1. Theme 1 – ‘illness beliefs’

The theme Illness beliefs covers participants’ individual ideas about, e.g., the aetiology of LBP and how to manage it. The participants mentioned various causes for their LBP. Frequently mentioned causes were too little exercise, an incorrect posture or work overload.

I have started to exercise less, and complaints have returned, so I think for me it’s all just about exercise. (P7)

However, for some participants the cause of LBP was attributed to their age or degeneration of their body. They indicated that there is not much they can do about their LBP.

..., but I have to say, I haven’t been doing a lot about the back pain myself. The pain is part of me. I can’t do much about it. (P4)

A majority of the participants realised that they have the biggest influence on dealing with their LBP themselves.

When you get to know your body and know what causes the pain you feel more control. What I will remember about e-Exercise, is that I realise that you are responsible for your own body and what you experience. That has been the biggest prize for me. (P9)

The need for sufficient information about LBP is essential to deal with the complaints correctly according to our participants. In addition, more insight into LBP provides reassurance.

Now, I know what to do to ensure that I can live without problems. That is the difference since my back pain started. In the beginning -of course- I didn’t know what it was, what to do and I thought my sport activities would be over forever. Now I worry a lot less when I experience back pain. (P7)

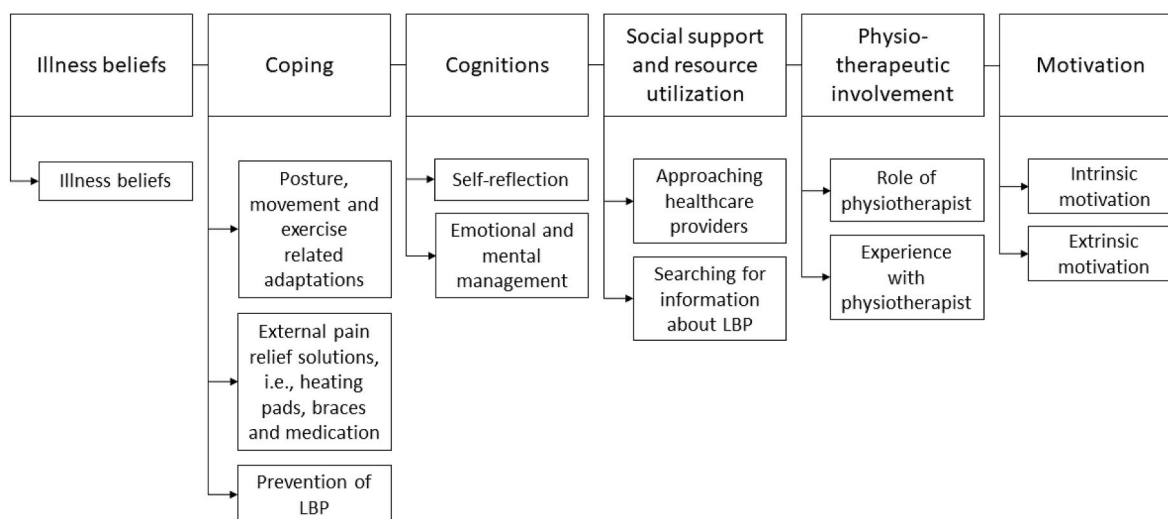


Fig. 1. Key themes and categories generated from the semi-structured interviews.

#### 4.2. Theme 2 – ‘coping’

This theme entails the strategies participants use to manage their chronic LBP. In general, the participants showed active coping strategies when experiencing LBP (e.g., adapting their posture, movement and exercise behaviour). However, in pain free periods in between relapses of LBP, very few participants continued these strategies. Approximately half of the participants performed the exercises recommended by the physiotherapist, while some others created their own exercise routine.

It is nice that you can just fall back on those exercises, because that puts you with both feet on the ground again. Like, you have to make an effort again, work on it again. ... and then the complaints diminish. (P10)

The only thing that will help in my case right now is indeed strengthening my back with exercises and walking daily. (P6)

Another important approach according to almost half of the participants is setting boundaries for themselves.

I think the best advice above all is to indicate those boundaries for yourself and get to know your body. Just teach yourself where the limit of the pain is and what you can do best to deal with it. (P9)

Nonetheless, a small number of participants searched for external pain relief solutions, i.e. heating pads, braces and medication.

To give myself a more secured feeling I tried a brace, a wide fitness belt as protection. So that was kind of protection for me. (P7)

Almost all participants indicated that they knew how to prevent LBP, however only a few individuals actually took steps to prevent LBP.

I just don't like doing that [exercise to prevent LBP], to do something extra. In the days when I had complaints, I did. ... I don't feel the need to do so right now. (P5)

Few participants asked others for help with heavy tasks to prevent LBP.

Some time ago, I got a new desk for my home workplace and it had to be lugged all the way up to the attic. Well, I wouldn't want to do something like that, because then I will definitely suffer afterwards. So it is nice that I can call for help from my children and they will come by. (P10)

#### 4.3. Theme 3 – ‘cognitions’

The theme cognitions entails how participants' thoughts about a situation led to behaviour and feelings. Participants suggested that understanding and accepting their LBP is important for their mental wellbeing. Furthermore, emotional and mental wellbeing had a major influence on how participants dealt with their complaints. For example,

stress and feeling depressed were cited as exercise barriers.

At a certain point you become discouraged because those complaints persist for so long. ..., but that [the reason why LBP can persist over time] was also explained. When you have had those complaints for a long time it can linger in your head for a longer period of time. I found that very enlightening. That was unknown to me. ... Then I think okay, that's how it works and I can accept it a little easier. (P10)

A minority spoke about the relationship between their level of stress and LBP, however, none of the participants used stress-reducing strategies.

Of course, I had heard before that stress has an impact on your body, so I am aware of that. ... I think it would be the best to do something about this too. (P11)

The participants reflected on their own self-management behaviour and their learnings.

But that [chronic LBP] is why I've had so many different physios and everything. ...but in the end I just know that the solution is myself. You can never be pain free, but I mostly just have to do it myself, to be able to relieve it [pain]. (P6)

#### 4.4. Theme 4 – ‘social support and resource utilization’

Social support describes to what extent social support from friend and family is experienced. Resource utilization involves how and when participants utilize resources, such as healthcare providers or other sources of information (e.g., the internet). Half of the participants indicated that they sometimes talked about their LBP with others (e.g., friends and family), but these were not in-depth conversations and only a few participants felt supported by their relatives and friends.

Yes, I told a girlfriend 'pff, I really have back pain now'. But that's where the conversation ends. ... And then she says: 'oh yeah, that's annoying, but well, I can't do anything about it either'. (P5)

Some participants contacted the physiotherapist immediately when experiencing LBP, while most of them tried to gain control over their LBP by themselves first.

Last time I really had problems with my back for a few months and then I go [make appointment with physiotherapist]. At that moment I cannot solve it myself. (P5)

Participants had a common reluctance to search for information on the internet.

It makes no sense, because when you search the internet about back pain you find a lot of nonsense. All kinds of so-called experts who give advice, often accompanied by very incorrect suggestions. (P12)

#### 4.5. Theme 5 – ‘physiotherapeutic involvement’

This theme covers the role of the physiotherapist and the participants’ experiences with the physiotherapist. None of the participants have had negative experiences with their physiotherapist. Participants who felt that physiotherapy influenced them reported that the physiotherapist helped them to understand their LBP and made them aware of how to manage their complaints.

I received a lot of solid information, which actually made it clear to me why I was doing those exercises. That made it easier for me to do those exercises. (P11)

The majority of participants perceived the physiotherapist as a healthcare provider who draws up an individual treatment plan in collaboration with their patients and, in particular, is perceived as a coach.

The physiotherapist will work on your back pain together with you. The physiotherapist does not take it away, because you also have a share in it. I think that’s the role of a physiotherapist, to give you the tools on how you can reduce and get rid of your back pain. (P5)

Some participants referred to their physiotherapist as a driving force to maintain and develop a healthy lifestyle (by e.g., education, providing exercises and coaching).

Because of the e-Exercise program, I went to a physiotherapist and started exercising again. I have faithfully maintained that, so that is an improvement. (P4)

However, a few of the participants saw their physiotherapist as the person who should solve their LBP.

Well, I just got a feeling like there is too much tension in my back and he [the physiotherapist] needs to fix it. (P3)

#### 4.6. Theme 6 – ‘motivation’

The theme motivation is all about the willingness of participants to perform, maintain or improve a certain behaviour. The participants showed a distinction between intrinsic and extrinsic motivation. The most common motivation to exercise was experiencing physical benefits.

... just less stiff in everyday things and you build up a kind of fitness. When I first had to lift something heavy, I felt it immediately, while now with those exercises, I get complaints less quickly. (P10)

One elderly participant used a metaphor to explain the reason for her daily exercise routine:

‘I can’t do that’ is not in my dictionary. I just compare it [my lower back] with an old door. It creaks a bit more, but it still opens and closes. (P1)

The urge to maintain a healthy lifestyle decreases in most of the participants when they are pain free.

If you don’t have it [LBP], then you forget what it was like. So, then you don’t do it [exercise] anymore. Because then you think, well I have no pain now, so why would I do those exercises? ... That is a disturbing trait, but it is human nature. (P6)

A minority of participants stated that they prefer exercising with others.

I have also noticed that doing those exercises on my own is much more difficult. If there is more social context, it is easier to do those exercises. (P11)

### 5. Discussion

The aim of this study was to gain an in-depth understanding of the self-management behaviour of people with chronic LBP, approximately 12–24 months after a physiotherapist guided blended self-management intervention. The predominant finding in this research is that the participants generally seem to show an adequate self-management behaviour when experiencing LBP, however the motivation to maintain this

behaviour diminishes during pain free periods. We paraphrase adequate self-management behaviour as the behaviour which matches recommendations from the clinical LBP guidelines (Staal et al., 2017; NICE, 2016). For example, if someone reported to stay active during a relapse it was seen as adequate, whereas inactivity and excessive painkiller usage was seen as inadequate self-management behaviour. Self-management behaviour was clustered within the following six interrelated themes: The first theme, illness beliefs, involves participants’ insight in their LBP. The second theme, coping, includes what strategies participants use to manage their LBP. Cognitions, the third theme, entails how thoughts about a situation lead to behaviour and feelings. The fourth theme, social support and resource utilization, involves to what extent social support is experienced and how and when participants utilize resources. The fifth theme, physiotherapeutic involvement, covers the role of the physiotherapist and the participants’ experiences with the physiotherapist. Finally, the sixth theme, motivation, is about the willingness of participants to perform, maintain or improve a certain behaviour.

The themes found in this study differed from Lorig and Holman’s well known conceptualization of self-management in some aspects (Lorig and Holman, 2003). These differences can be declared by the specific population in this study, i.e., patients with chronic LBP who received a blended self-management intervention led by a physiotherapist, while Lorig and Holman’s model is designed for health care in general (Lorig and Holman, 2003). The first difference is that this study yielded the theme ‘illness beliefs’ whereas Lorig and Holman did not find a comparable theme. Illness beliefs in patients with chronic LBP has a significant contribution to the success of rehabilitation (Glattacker et al., 2013). Second, in this study, Lorig and Holman’s ‘problem solving’, ‘decision making’ and ‘action planning’ skills are incorporated within the themes ‘coping’ and ‘cognitions’. The interviews performed in this study revealed a clear distinction between active and passive coping strategies. Third, whereas ‘resource utilization’ was in accordance with Lorig and Holman’s model, we found the theme ‘physiotherapeutic involvement’ and not ‘the formation of a patient-provider partnership’. This was demonstrated by the fact that this study focused not only on the relationship, but also on participants’ perceived role of the physiotherapist in their self-management. Lastly, this study described the theme ‘motivation’ since the participants’ motivation appeared to be the overarching skill that decisively determined what self-management strategies they applied to oneself.

While the majority of patients with chronic LBP are commonly associated with poor self-management behaviour (Leung, 2012; Snelgrove and Lioffi, 2013), our participants who participated in the intervention group of the e-Exercise trial generally seemed to show adequate self-management behaviour when experiencing relapses of LBP. Performing exercise and modifying activities were predominant self-management strategies. However, when not experiencing LBP, the motivation to maintain a healthy lifestyle diminishes, which is consistent with previous studies (May 2007; Liddle et al., 2007). Since a physically active lifestyle is important in the prevention of recurrent LBP, it is recommended to facilitate this behaviour, for example by drawing up an exercise program that meets both the patients’ needs and the physiotherapists’ expertise and experience (Staal et al., 2017; NICE, 2016). Surprisingly, medication was minimally discussed by our participants, while this was a much discussed item in other studies (Crowe et al., 2010; Kawi, 2014). Our participants regarded medication as a method for immediate symptom relief, but no long-term solution, whereas performing exercise was reported as the number one choice to reduce complaints. These beliefs and behaviours are coherent with the information modules of e-Exercise LBP, which can possibly be an explanation for these findings. However, it should be noticed that this study was not designed for the evaluation of specific components of e-Exercise LBP.

A distinctive finding of this study is the physiotherapists’ role in patients’ self-management behaviour after finishing their

physiotherapist guided blended intervention. Although patients finished their treatment months prior, the physiotherapist still was mentioned as a driving force for self-managing their LBP. Conversely, a recent study of [Hutting et al. \(2020\)](#) showed that patients generally experienced a lack of self-management support by their physiotherapist ([Hutting et al., 2020](#)). This discrepancy could be explained by the fact that physiotherapists in our study followed a course in the application of the self-management intervention e-Exercise LBP whereas many health professionals are inadequately trained and lack confidence in managing long-term musculoskeletal pain conditions ([Lim et al., 2019](#)). Furthermore, physiotherapists who treated participants from this study were aided by the e-Exercise LBP app in supporting patients' self-management behaviour. Both physiotherapists' training and the app were based on existing clinical guidelines which might have influenced their behaviour since it is known that there is generally a suboptimal use of guidelines for treating patients with chronic LBP by physiotherapists ([Lim et al., 2019](#); [Physiopedia contributors, 2019](#)).

Another remarkable finding is that the participants barely experienced support from their social environment, although social support plays an important role in managing stress and maintaining physically active in patients with chronic LBP ([Jung and Jeong, 2016](#); [Buruck et al., 2019](#)). Additionally, participants in this study seldom mentioned psychological difficulties. A possible explanation for this could be that patients are generally unaware of the relationship between psychological factors and their chronic LBP ([Alhowimel et al., 2018](#)). The ability to recognize and deal with the psychosocial and consequences of a chronic condition is seen as an essential part of self-management ([Barlow et al., 2002](#); [Jung and Jeong, 2016](#)). Therefore, it is recommended to facilitate contact with peers, for example by the organisation of group exercises at the physiotherapy practice or the integration of a forum in the e-Exercise LBP app. Furthermore, it is important for physiotherapists to remember that the psychological as well as the physical environment affect the patients' perceptions and motivation to maintain an adequate self-management behaviour.

## 6. Strengths and limitations

A strength of this study is that the model of Lorig and Holman was used to develop the topic guide and in the final phase of data analysis. By using such a preconceived framework there is a risk of neglecting important insights in analysing data ([Dierckx de Casterle et al., 2012](#)). However, the Lorig and Holman model was found to maintain a suitable framework for assembling and analysing the data. By using semi-structured interviews with open-ended questions and using a hybrid approach of both deductive and inductive reasoning, we facilitated the investigation of new insights.

A limitation of this study is that it focuses specifically on a population which received a blended self-management intervention. Based on the design of the study the specific influence of both the physiotherapist and the smartphone app on patients' experienced self-management

behaviour in the long term is unknown. The fact that the participants participated in a RCT is not seen as source of bias, since the RCT had a pragmatic design in which patients participated who requested their physiotherapist for help on their own initiative ([Koppelaar et al., 2020](#)). Their preference for a physiotherapist and the fact that they followed an intervention guided by a physiotherapist might explain the theme 'physiotherapeutic involvement'. Since there is already a substantial body of knowledge in self-management behaviour in general, this study is highly relevant to physiotherapists treating patients with chronic LBP.

## 7. Implications

The findings of this study can expand the awareness of physiotherapists on the perspectives, experiences and obstacles of patients with chronic LBP regarding self-management. This will be especially relevant when these patients consult their physiotherapist again during a relapse. Self-management should not be confused with self-care, i.e., patients who return to their physiotherapist while experiencing a relapse still seem to show adequate self-management behaviour, since they take actions and collaborate with a professional ([Kongsted et al., 2021](#)). This study showed that patients with chronic LBP after a self-management intervention are well equipped with management strategies, however they might benefit by some extra support sometimes. This could also be enhanced by promoting social support such as encouraging conversations about chronic LBP with peers, or by including relatives and friends into the physiotherapeutic treatment ([Snelgrove and Liossi, 2013](#)) or setting up joint exercise groups.

To gain further insight in the effectiveness of e-Exercise LBP on self-management we recommend to compare these findings with the results of the RCT on the (cost-) effectiveness of e-Exercise LBP ([Koppelaar et al., 2020](#)). Furthermore, future research could focus on how physiotherapists can facilitate ongoing behaviour change in patients with chronic LBP in pain free periods.

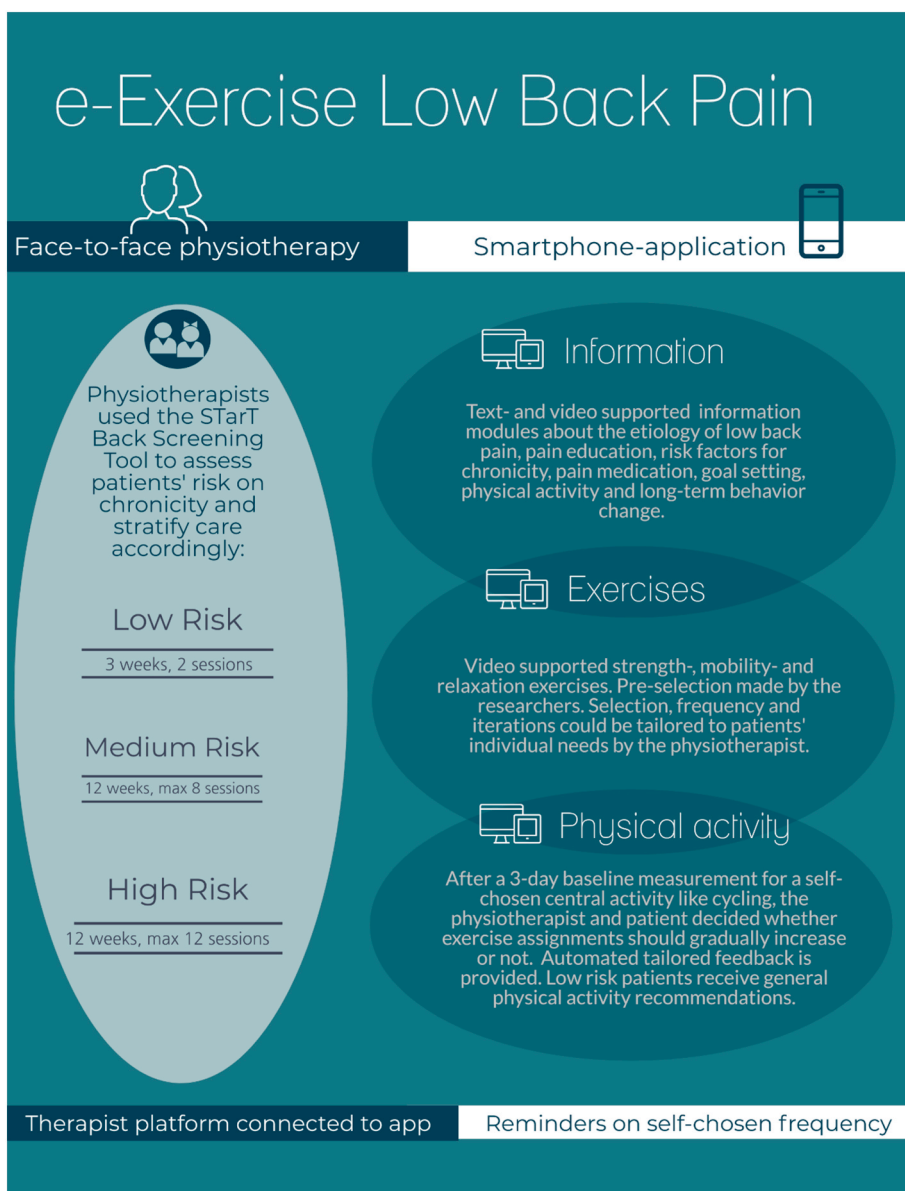
## 8. Conclusion

In our study the majority of the participants seemed to show adequate self-management behaviour when experiencing LBP. Most participants first try to gain control over their LBP themselves when experiencing a relapse before contacting the physiotherapist. However, participants struggle in continuing their healthy behaviour in pain free periods in between relapses of LBP. Physiotherapists are recommended to encourage long-term behaviour change. Additionally, improved facilitation by the physiotherapist or additional functionalities in the app to stimulate social support might have a useful contribution.

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## Appendix I: e-Exercise Low Back Pain



Appendix II: COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

Topic	Item No.	Guide Questions/Description	Reported on Page No.
<b>Domain 1: Research team and reflexivity</b>			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	3
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	1
Occupation	3	What was their occupation at the time of the study?	1
Gender	4	Was the researcher male or female?	1
Experience and training	5	What experience or training did the researcher have?	4
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	3
Participant knowledge of the interviewer goals, reasons for doing the research	7	What did the participants know about the researcher? e.g. personal	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator?	
e.g. Bias, assumptions, reasons and interests in the research topic	3		
<b>Domain 2: Study design</b>			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9		

(continued on next page)

(continued)

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology,	
content analysis	3		
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience,	
consecutive, snowball	3		
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail,	
Email	3		
Sample size	12	How many participants were in the study?	4
Non-participation	13	How many people refused to participate or dropped out? Reasons?	N/A
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	3
Presence of non- Participants	15	Was anyone else present besides the participants and researchers?	3
Description of sample data, date	16, 3, 4	What are the important characteristics of the sample? e.g. demographic	
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	N/A
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	3
Field notes	20	Were field notes made during and/or after the interview or focus group?	3
Duration	21	What was the duration of the inter views or focus group?	4
Data saturation	22	Was data saturation discussed?	3
Transcripts returned	23	Were transcripts returned to participants for comment?	3
Topic	Item No.	Guide Questions/Description	Reported on Page No.
<b>Domain 3: analysis and findings</b>			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	3
Description of the coding Tree	25	Did authors provide a description of the coding tree?	4, 5
Derivation of themes	26	Were themes identified in advance or derived from the data?	4
Software	27	What software, if applicable, was used to manage the data?	4
Participant checking	28	Did participants provide feedback on the findings?	3
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	4-7
Data and findings consistent	30	Was there consistency between the data presented and the findings?	4-7
Clarity of major themes	31	Were major themes clearly presented in the findings?	4-7
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	4-7

Appendix III: Topics & Interviewguide

Problem solving	If you are currently experiencing low back pain: Can you tell me how you are coping with this?- If not: Can you tell me how you plan to deal with low back pain, if it returns?
Decision making	- How do you determine what works and what does not work to gain control over your complaint?
Resource utilization	- Do you ever discuss your complaints with others and if so, with whom and why?
The formation of a patient-provider partnership	- Can you tell me about your collaboration with the physiotherapist?
Action planning	- What is the moment for you to do something about low back pain?
Self-tailoring	- How have you implemented low back pain advice in your own daily life?

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