Web-based self-care for acute non-specific low back pain: An exploratory study of user experience and acceptability

Weixi Yuan

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Student: Weixi Yuan

Internal supervisor:
Dr. P. M. Carrera

External supervisors:
Prof.dr.ir. H.J. Hermens
W. O. N. d'Hollosy, Msc

Master Program Health Sciences
Health Services and Management
Faculty of Science and Technology

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I hope you will enjoy reading it.

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Abbreviations

CDSS	Clinical Decision Support System
GP	General Practitioner
KNGF	Koninklijk Nederlands Genootschap voor Fysiotherapie
LBP	Low Back Pain
METC	Medisch Ethische Toetsingscommissie
NSLBP	Non-Specific Low Back Pain
PEU	Perceived Ease of Use
PT	Physiotherapist
PU	Perceived Usefulness
RCT	Randomized Controlled Trial
RNT	RugNetwerk Twente
RRD	Roessingh Research and Development
TAM	Technology Acceptance Model
TREST	Treatment-strategy-based classification

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Abstract

Background

This study is an initial attempt to gain insight into the experiences and acceptance of people with acute non-specific low back pain receiving web-based self-care prior to visiting health care providers in Twente. The self-care was performed on mijntelerevalidatie.nl, which is an online intervention providing healthcare service to chronic ill patients at home.

Method

Literature study and semi-structured interviews were conducted to identify available effective exercises in physiotherapy. Existing exercises on mijntelerevalidatie.nl were then categorized for the web-based self-care of patients with acute non-specific low back pain. A mixed-methods approach was applied to elicit participants' perception and experience in using the web-based self-care. The data were analyzed using qualitative analysis methods.

Results

Ten physiotherapists were interviewed. Combined with findings from literature study, exercises were categorized into four groups: range of motion (mobilization), stabilization, relaxation and pregnancy-related low back pain exercises. The advice was added by strong support from physiotherapists. Fifteen participants who self-reported with acute non-specific low back pain used the web-based self-care for one time, as lab study. Participants expressed the self-care was easy to understand and perform. They also showed interest and inclination to continue using it in real life. The key barrier in using web-based self-care was the lack of supervision from health care providers.

Conclusions

Overall, the web-based self-care appeared to be an acceptable online tool for people with acute low back pain to perform exercises independently. The performed exercises were retrieved mainly from physiotherapy clinical treatment. The findings are promising and suggest further study on the feasibility and effectiveness of using the web-based self-care.

1 Introduction

This chapter introduces the main problems that are solved in this thesis. Background information and context of this research are presented to give readers an overview: definition of low back pain, its treatment, web-based intervention, objective of this research and research question.

1.1 Low back pain

Low back pain (LBP) is a problem that most people have experienced to some extent. It continues to be the leading cause of activity-limiting or disability for patients visiting primary care (van Tulder, et al., 2006; Suman et al., 2015; Koes, et al., 2010). The pain is below the costal margin, above the inferior gluteal folds (see *Figure* 1), and with or without leg pain. There are several types of LBP categorized. Acute LBP is defined as having LBP less than 6 weeks and it can develop to sub-acute and chronic LBP with a time period of more than 6 weeks and 3 months, respectively. *Figure* 2 shows different types of LBP regarding their own clinical picture and etiology. The causes of LBP in primary care are hard to identify, but most are due to a mechanical factor related to a certain body musculoskeletal structure (Ladeira, 2011). It is reported that about 90% of all LBP is diagnosed as non-specific low back pain (NSLBP) and occurring in all age groups (Krismer &van Tulder., 2007; Staal et al., 2013). It is defined as not attributable to underlying pathological problems, such as vertebral fractures, malignity, ankylosing spondylitis, severe forms of vertebral, canal stenosis, or severe forms of spondylolisthesis, tumor, etc. NSLBP holds a risk of chronicity when left untreated. Among most of the acute LBP cases, patients can recover within 6 weeks without specific treatment, but the recurrent rate within one year is high (Krismer &van Tulder, 2007). Chronic LBP is an activity-limiting condition, thus this has resulted in calls for proper care education and relevant intervention in the acute phase. Only 50 percent of patients with LBP will seek care. A part of this group will stop consulting after getting better, although the chance for recurrence is high (Wand & O'Connell, 2008). LBP also brings enormous socioeconomic burden to individuals and society, through a high number of visits to health care providers, disability, sick leave, and lower productivity (Suman, et al., 2015). The chronic group of patients is the main source of the high costs (Burton et al., 2006). Therefore, preventing chronicity in the acute phase of LBP in primary care draws necessary attention. To avoid chronicity proper early intervention is essential.

Figure 1 Location of low back pain

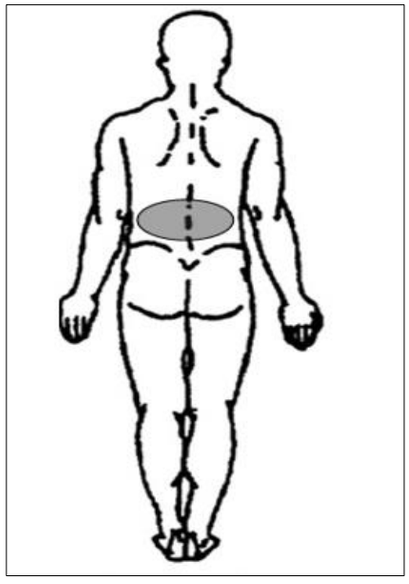
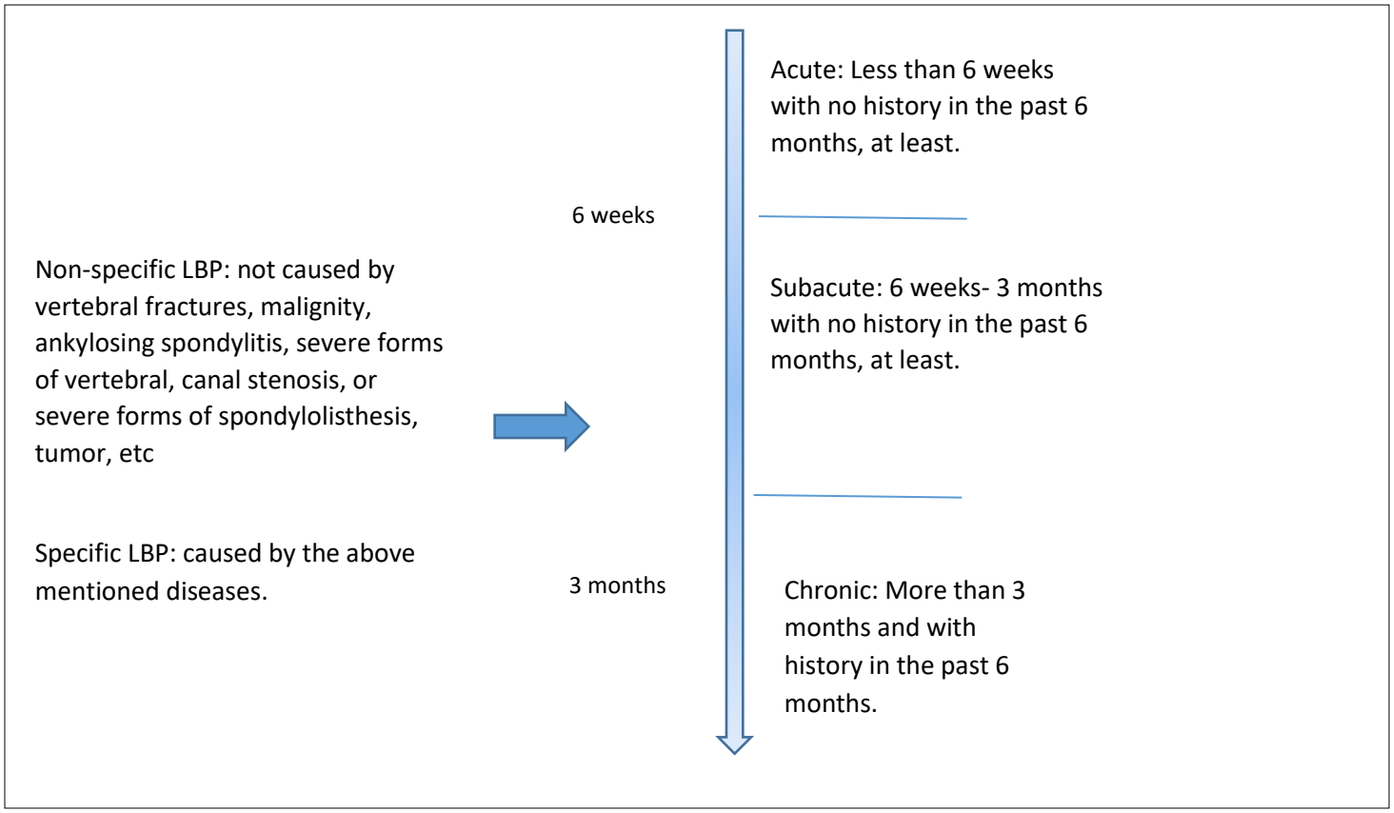


Figure 2 Classification of low back pain



1.2 Treatment

Treatment of NSLBP in primary care to prevent recurrence, or chronic LBP, is conservative. European guidelines recommend patient education, spinal manipulation, physical modalities and medications (Koes et al., 2010). Modalities such as massage, ultrasound and traction have limited evidence support as treatments (Staal et al., 2013). Although European guidelines have little support for specific exercise programs as an early treatment, more recent studies demonstrated positive results of exercise on pain and disability functions (Fritz et al., 2003; van Middelkoop et al., 2010). Some of the common exercises generally known are stretching exercise, strengthen exercise, stabilization exercise (core stability), aerobic exercise, and back school (Smith et al., 2014). Although the systematic reviews have indicated the effectiveness of exercise for chronic NSLBP in some clinical outcomes, there is no clear evidence showing a particular type of exercise with priorities than other exercises (van Tuldar et al., 2000; van Middelkoop et al., 2010; Hayden et al., 2005; Lizier et al., 2012).

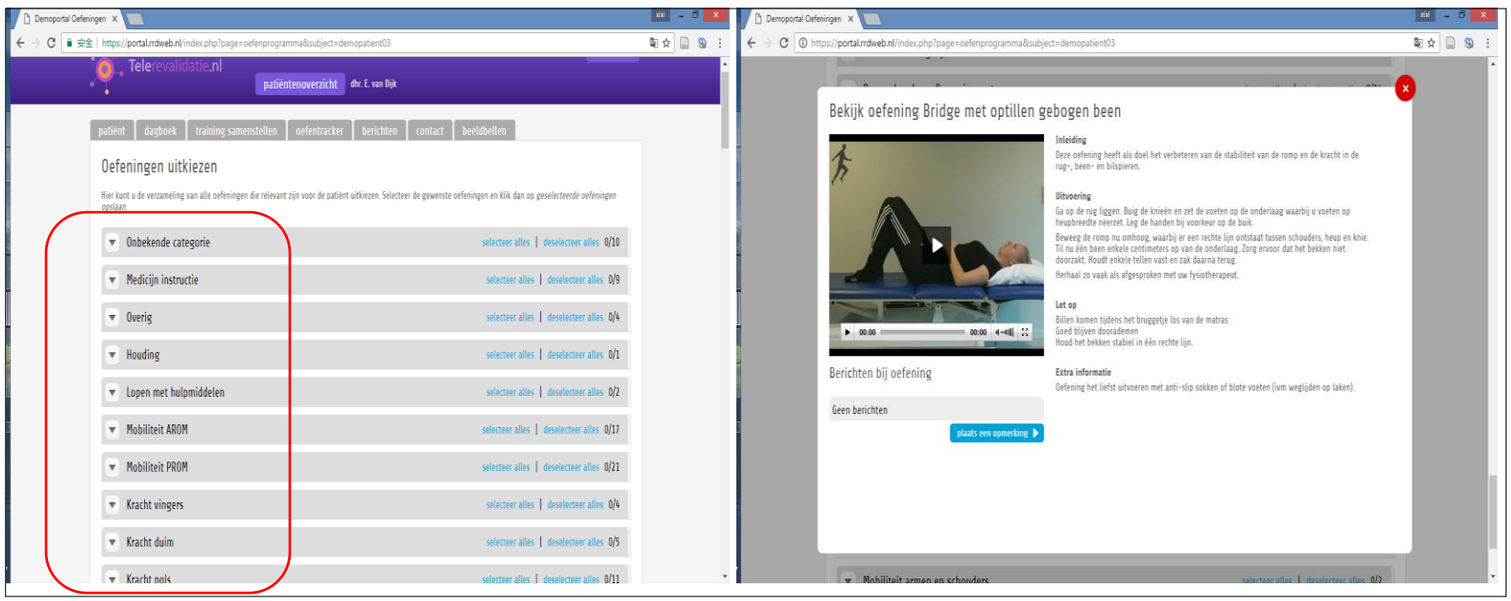
To make treatment effective, taking into account of the nature of NSLBP, the role of patients themselves is a crucial component as well. Self-care as an alternative way of seeking health care has been advocated in NSLBP, which could avoid barriers of unnecessary visits to health care professionals, time and access. A meta-analysis study of the effectiveness of self-care has shown decreased pain and disability (Oliveira et al., 2012).

1.3 Web-based intervention

Self-care can be applied with the implementation of available eHealth technology. E-Health is defined by Eysenbach (2001) as "an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies". Nowadays, people have easy access to the internet for searching health-related information as an alternative way to gain knowledge. It leads to patient empowerment and reduces barriers of face meeting with health care providers (Zufferey et al., 2009).There has been increasing studies which investigate the usage of websites as a channel to deliver interventions to patients with LBP with mixed results (Weymann et al., 2015; Del Pozo-Cruz et al., 2013). One recent systematic review reported the effectiveness of web-based interventions to chronic LBP but with limited data (Garg et al., 2016). However, the diverse web-based interventions have been questioned regarding its quality. Meanwhile, the need of accurate online information is increasing. An evaluation study conducted by Hendrick et al., (2012) found out the online information of managing NSLBP was lacking evidence and the content was elusive for people to understand.

Mijntelerevalidatie.nl is an online intervention, designed by Roessingh Research and Development (RRD) center.[1] It mainly has seen use in the elderly rehabilitation centers for chronic patients in the Netherlands. It contains patients' health status monitoring, online exercises, lifestyle monitoring and online interaction with health care professionals. Patients become more independent through use of this website, being able to take care of themselves. As shown in *Figure* 3, screenshots of the portal of mijntelerevalidatie.nl, the top screenshot shows different categories of exercises, which are also highlighted. The bottom screenshot shows a particular exercise including video instruction.

Figure 3 Illustrative screenshots of portal of mijntelerevalidatie.nl (in Dutch)

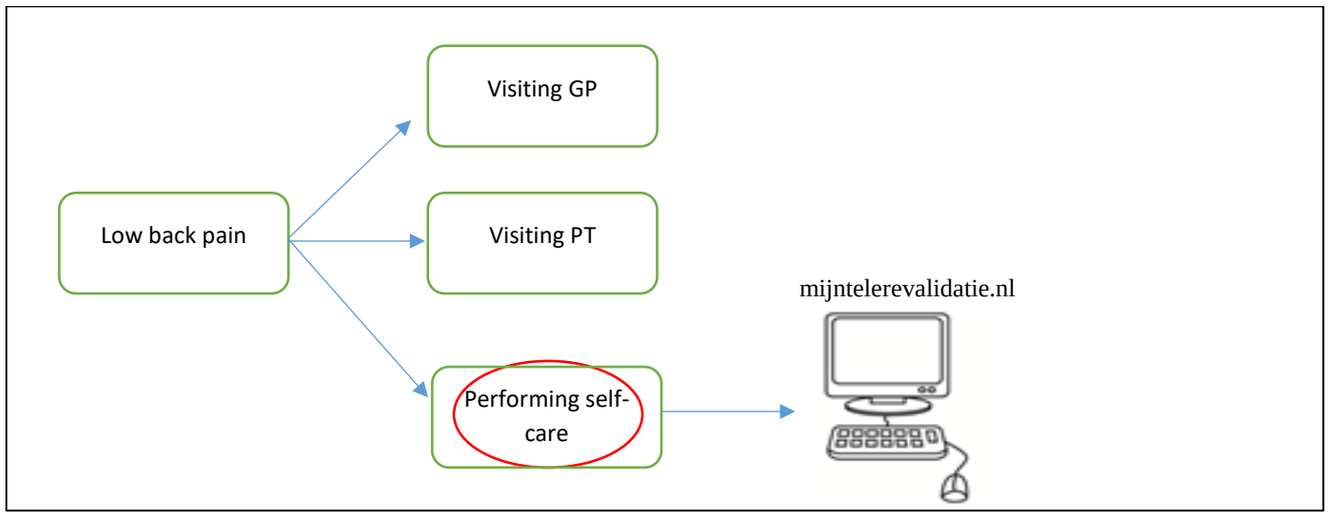


[1] http://www.tele-nu.nl/telerevalidatie

1.4 Objectives

In the Netherlands, patients can self-refer themselves to physiotherapists (PTs) for help, aside from only visiting general practitioners (GPs) as primary care (Leemrijse et al., 2008). Mostly PTs will be the main health care providers to give exercise treatment on NSLBP patients. In the UK, GPs have short consultation times due to their busy schedule, and they refer patients to PTs for further treatment (Geraghty, 2015). Based on the existing systems, self-care is added as a future design of a web-based clinical decision support system (CDSS) for managing LBP in primary care: visiting GP, visiting PT and self-care performance (d'hollosy et al., 2015). It helps to identify patients who are likely to have LBP that they can manage themselves without visiting health care providers. *Figure* 4 illustrates a simple structure of the three pathways. The highlighted self-care will be implemented through a web-based intervention, mijntelerevalidatie.nl.

Figure 4 Overview of the three pathways for care seeking based on the CDSS concept



However, no particular exercises were mentioned, and that could lead to the lack of generalizability of exercises. In terms of exercises treatment, the guidelines of Royal Dutch Physiotherapy ('Koninklijk Nederlands Genootschap voor Fysiotherapie' or KNGF) classify three patient profiles for NSLBP (Staal, et al., 2013). Besides, when looking at online exercises, the current 'one-size fits all' exercises poorly support individual patients, reducing the potential benefits, which in turn could lead to an ineffective intervention. To find out effective exercises of self-care, criteria to assure exercises regarding their effectiveness have been discussed (van Tuldar et al., 2000; Brennan et al., 2006).

Limited studies were carried out on web-based intervention for acute LBP compared to chronic LBP (van Middelkoop et al., 2010). Treatment of acute patients is as important as of chronic patients, as mentioned earlier. Therefore, this study will target patients who are able to manage their lower back pain independently in the acute phase.

This study aims to provide insight into the issues on how patients experience online self-care prior to visiting health care providers. The objective of this study is to find out the evidence-based exercises for acute NSLBP and evaluate to what extent the potential users perceive the online self-care. For this phase of study, it is essential to receive early feedback on how the patient values the service. The global research question is:

"What is the evidence-base on exercises for acute non-specific lower back pain and the experience of users of self-care via mijntelerevalidatie.nl?"

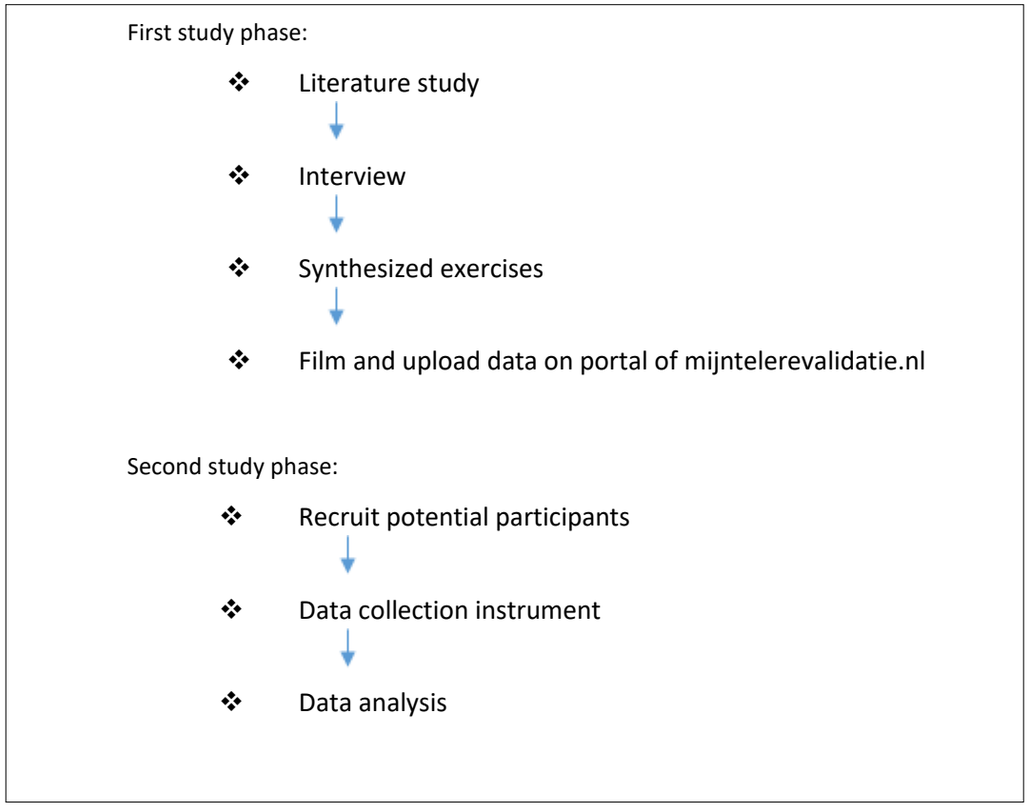
Sub-questions:

- Is there already some existing classification of NSLBP?
    - If yes, what are the subgroups and their corresponding exercises for patients in acute phase?
- What are the available effective exercises for patients with acute NSLBP?
- How do people with acute NSLBP perceive the acceptability and usability of the web-based self-care on mijntelerevalidatie.nl?
- What are participants' experience of trying self-care on mijntelerevalidatie.nl?

2 Methods

This chapter explains how the study objectives will be achieved. Different steps have been followed *(*see *Figure* 5). The first phase consisted of a review of literature and interview to identify relevant exercises for acute NSLBP. The second phase was an evaluation of obtaining participants' opinions and experience.

Figure 5 Research process



2.1 First Study phase: Literature study

To gather the evidence-based self-care exercises, a literature study was performed. The aim of the literature study was to identify: 1) possible subgroups of patients with LBP, 2) effective treatment for acute non-specific low back pain. The parameters of the effectiveness of LBP treatment were pain intensities and physical functioning (Chiarotto, et al., 2015).

The databases that have been used for searching were PubMed [2]and Scopus[3]. Some articles were searched manually through reference lists of searched articles. Guidelines have been searched as well. During searching, the boolean operators "OR" and "AND" have been used for selecting the relevant resource. The search terms were as follows: "subgrouping", "classification", "non-specific low back pain" "self-care", "therapeutic exercises", "ANLBP", "acute non-specific low back pain", "pregnant low back pain". During searching, results of pregnancy-related LBP were displayed. To get sufficient information, searching term like "pregnant low back pain" has been included as well. Starting from reading titles and abstracts based on exclusion criteria. If the articles or reviews seemed relevant, a full screening of the text was carried out.

Exclusion criteria:

- Not written in English
- Inclusive publication date before 2000
- No full text available
- Exercises which patients cannot perform independently
- Chronic, subacute low back pain, the time period of low back pain was more than 6 weeks
- Not RCTs or reviews
- No lumbar related back pain mentioned for pregnancy-related low back pain

2.1.1 Interviews

To get the opinions and ideas on relevant exercise treatment attached to physiotherapists' knowledge and experience, semi-structured interviews were performed. This method is widely used in qualitative research in the field of health care (Gill et al., 2008). Questions were open-ended to elicit enough information from interviewed participants.

Prior to interviews, a questionnaire was prepared (See Appendix A). As shown in *Table* 1, the questionnaire consisted of four themes which aimed to obtain more depth perspective, experience and opinions in clinical practice from PTs regarding treating patients. During the interview, questions were inserted to the progressed interview automatically to be able to get enough sources to answer the research question (Bryman, 2004). Recruitment criteria for the PTs were as follows: they were able to understand and speak English, had experience with treating LBP patients, and had an official diploma. All participants were informed about the purpose of the interview via emails. The interviews were audio recorded in English with the agreement of participants.

For analysis purposes, thematic analysis was conducted manually and inductively on Microsoft Word. It was considered as a basic method for data analysis of qualitative research (Thomas, 2006; Braun et al., 2015; Braun et al., 2006). It provides a flexible way of extracting concepts and themes from raw data. The whole process consisted of transcription, coding, clustering and interpretation. Recordings of the interviews have been listened iteratively and transcribed into text. After this stage, phrases or key words were made of what was being said in the text. This was also called "open coding" which means extracting participants' own words from lines (Sparkes & Smith, 2014). For instance, the next stage was analyzing, categorizing coding into new themes with emerging data. Codings

[2] https://www.ncbi.nlm.nih.gov/pubmed
[3] https://www.scopus.com

were allocated under each of the themes or categories in a new page. From the obtained data, some overlapping words were deleted and similar concepts could be grouped together. In the end, the reduced data sheet can be interpreted to answer the research question. The final results were read and validated by three physiotherapy participants in order to reduce the element bias and approach a rigorous study (Brink, 1993; Thomas, 2006; Burnard et al., 2008). The procedure of coding and formulating categories were performed by one person.

Table 1 Pre-determined themes of the questionnaire

Subjects	Purpose
• Professional background	• To know their specialization and experience
• Professional experience and perspective of treating LBP	• To know to what extent they have worked with LBP and how they treat it
• Exercise-therapy as the main intervention for self-care	• To detect the most common exercises for self-care as used in daily practice
• Relevant questions with regard to web-based self-care exercises	• To get a general idea of issues about patients performance of exercises

2.2 Second Study Phase

The final selected exercises were viewed and verified by three PTs who have been interviewed as well. The obtained data of exercises were arranged and filmed by a researcher from RRD under the supervision of an experienced PT who also has been interviewed. A physiotherapy intern performed those exercises. The language of filming was in Dutch. After uploading exercises online, the evaluation started.

2.2.1 Participants

Several approaches of sampling have been used to get eligible representative participants: public notification and emails, snowball sampling or word of mouth by some study participants. The tasks of this experiment were introduced and informed consent was obtained. Participants' age was set between 18 and 65 years old. They were asked about the agreement to participate the study as a volunteer and self-reported the participating criteria. The inclusion criteria include: (i) LBP within a period of 6 weeks (ii) Have not received exercises from health care professionals (iii) Able to speak and understand Dutch and English (iv) Internet access at home. Exclusion criteria include: (i) Previous treatment received of low back pain in the past 6 months (ii) Traumatic, specific LBP or referred pain to legs.

2.2.2 Ethics considerations

A letter of consent was sent via email to Medisch Ethische Toetsingscommissie (METC) Twente to request for participation of the evaluation study phase. When permission was granted, invitation and recruiting potential participants started. Informed consent was given to each of the participants. The names of the participants are anonymous.

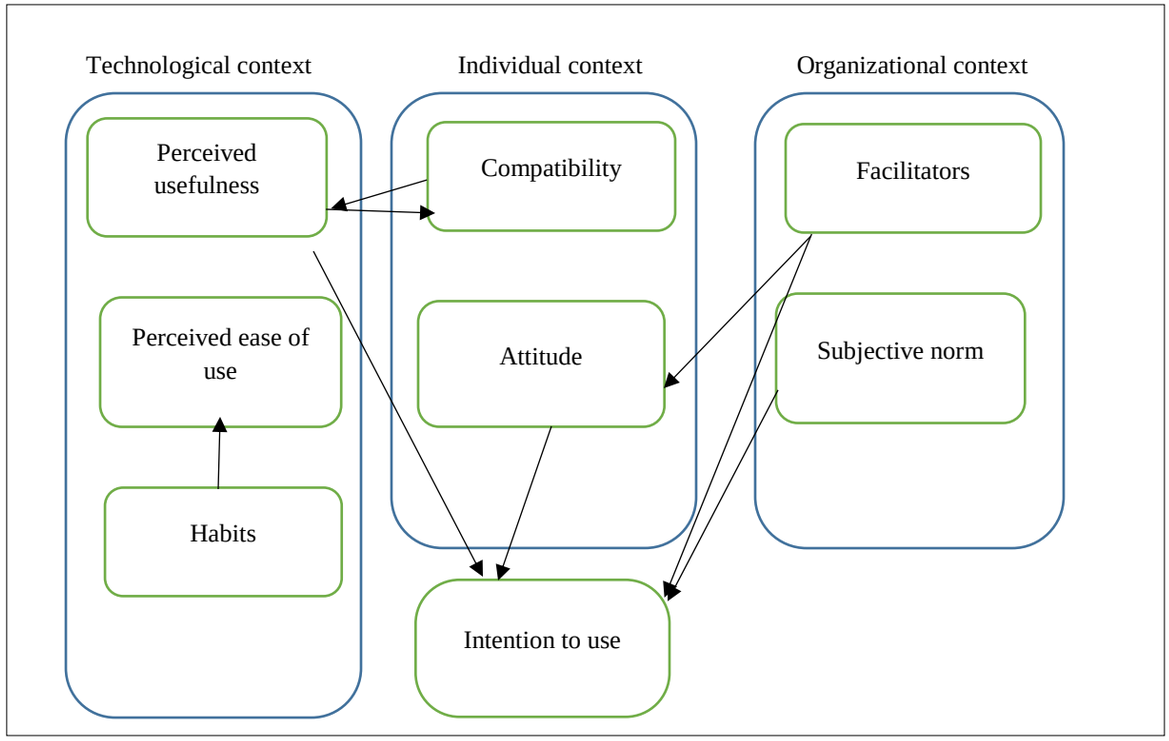
2.2.3 Data collection instrument

Data from the evaluation session was obtained via observation notes during performance, questionnaires and semi-structured interviews.

To have an idea of the participants' experience, usability and acceptability have been considered. Usability and acceptability evaluation of health information systems was assessed to know: how easily the participants could perform self-care and whether they liked it or not. There are different ways to evaluate usability and acceptability as a whole or separately (De Graaf et al., 2013; Kuhniruk et al., 2004; Albar et al., 2015). Albar et al., (2015) explained usability as "How the user values the system functions in terms of easy to use and learn, efficient to use, easy to remember, few errors and pleasant to use", and acceptability is "user's willingness within a special target group to employ the tool for the tasks it is designed to support".

The questionnaire was useful as an extensively used tool to evaluate participant's experience of self-care (Kushniruk & Patel, 2004). The Technology Acceptance Model (TAM) has been used in research study to assess acceptance, originally designed by Davis (Gagnon et al., 2012; Davis, 1989). The original TAM contained themes of perceived usefulness (PU) and perceived ease of use (PEU), which were defined as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" and "the degree to which the prospective user expects the target system to be free of effort" respectively (Alharbi & Drew, 2014). It is an intention-based model and aims to explaining the behavior of acceptance of computer technology (Hu et al., 1999). Its reliability and validity were verified with evidence (De Graaf et al., 2013). A modified TAM has been studied by Gagnon et al., (2012) for assessing the behavior intention and possibility of accepting health technology. As shown in *Figure* 6, the theory is based on three contexts: individual, technical and organizational sides. The theoretical framework also includes dimensions of "attitude", "habit", "compatibility", "subjective norm" and "facilitators". Concept of attitude gives an idea of perception of using online self-care by participants .Habit is understood as the behavior of using technology automatically. Compatibility is understood as to what extent the online self-care can integrated with current existing values and systems. Subjective norm helps to understand the believes from individual participants regarding using the online self-care. Following facilitators, which gives an idea of the extent to which participants think the technical issues to support the online self-care (Gagnon et al., 2012). Among those dimensions, studies showed that some of them affect each other positively (Alharbi & Drew, 2014; Gagnon et al., 2012). For example, PEU affects attitudes toward using a web-based self-care and when PU increases in also affects the intention to use positively to a web-based self-care in this study. The questionnaire is a 7 Likert scale and translated into Dutch in this study (See Appendix B).

Figure 6 Composed theoretical model on TAM



(Gagnon et al., 2012)

2.2.4 Procedure of evaluation on participants

The evaluation of the web-based self-care performance was arranged as a laboratory study. Prior to collecting data, one participant was conducted to test the time spending, exercise performing session and questionnaire of the evaluation session.

All participants were given verbal and written information about this study, tasks and voluntariness before they start to use the online self-care as well as interviews. They were also instructed to speak out loud about things they liked and disliked during the performance (Kuhniruk et al., 2004). A study evaluator accompanied the participants while performing the self-care. In that case, information of how participant felt and performed of each exercise could be easily collected by taking notes and recordings. A physical place was chosen with enough space, a yoga mattress chair and computer with internet. In following up the self-care part, a pen-and-paper questionnaire with open-ended questions was approached to participants, which contained such questions as i) What are the three positive points of the web-based self-care from your experience? ii) What are the three negative points of the web-based self-care from your experience? iii) What are the three exercises you like most? iv) What are the three exercises you like least? v) Do you feel safe to perform those exercises? Three participants were interviewed via a skype meeting instead of face-to-face due to the fact that they were located remotely.

2.3 Reliability and validity

This study is a qualitative research, which makes it relatively difficult to assess the reliability, compared with a quantitative study. To make sure of the reliability and validity of the qualitative methods have been used in this study and conducting a rigorous research, some tactics have been taken. In the two interview phases, recording was conducted via software of Voice Memos and transcribed into words. This made it easier to cite quotes from interviewees directly and check repeatedly in order to minimize the bias (Gill et al., 2008). The validity of the findings was verified by using the methodological triangulation: observation notes, questionnaires and interviews. By implementing them together, biases are decreased and accuracy is improved of final findings (Brink, 1993; Anderson, 2010).

3 Results

This chapter describes the findings of relevant exercises as well as the evaluation of participants' experience with the assessment.

3.1 Resulting classifications of and exercises to treating NSLBP

The existing classification systems are categorized based on mechanical, patho-anatomical, and bio-psychosocial domains: treatment-based classification, McKenzie and STarTback screening tool. *Table* 2 displays the available subgrouping methods with their corresponding treatments. It should be noted that there are some similarities between those classifications and their corresponding treatments.

Treatment-based classification

The treatment-based classifications was initially proposed by Delottie et al., (1995) and was based on the results of diagnosis of symptoms and impairments (George, et al., 2008). Studies have been discussed the effectiveness of this classification (Fritz et al., 2003; Hebert et al., 2011; George et al., 2008). The 4 treatment-based classification subgroups are: immobilization, mobilization, specific exercise and traction. A later feasibility study designed treatment-strategy-based classification (TREST) which was based on the concept of treatment-based classification.in primary care (Widerström et al., 2016). It also has 4 subgroups: pain modulation, stabilization exercise, mobilization and training. In terms of stabilization exercises, Kisner & Colby (2007) recommended a series of progressive exercises for training stability of lower back.

McKenzie

The McKenzie approach was based on biomechanical factors and divided into three subgroups: derangement syndrome, dysfunction syndrome and postural syndrome (Machado et al., 2010). This broadly studied method emphasizes on the treatment approach of postural correction, repeated end-range movements of restricted direction (Machado et al., 2005). It has two concepts namely directional preference and centralization phenomena movement. Directional preference means that movement in one direction, such as flexion, extension or lateral flexion, can relieve symptoms. This was also mentioned in the treatment-based classification. Centralization refers to pain centralized to the spine and it helps to better understand which movement of the lower spine is suitable for individual patient (Machado et al., 2010).

STarTback screening tool

The STarTback screening tool is another classification tool used in primary care. It classifies NSLBP into low risk, medium risk, and high risk. It is based on psychosocial factors such as pressure, pain and disability. The recommended exercises are relaxation exercise, mobility exercise, functional strengthening exercise and general aerobic exercise (O'Sullivan et al, 2014).

Table 2 Different classification systems of NSLBP

Classification	Rankings→ treatment
Treatment –based classification	• Immobilization/stabilization → Trunk strengthening and stabilization exercise • Mobilization → Joint mobilization and active range of motion exercises • Specific exercise → Lumbar flexion extension exercise • Traction → Mechanical or auto-traction
TREST	• Pain modulation: McKenzie centralization oriented exercises, low intensity home exercises • Stabilization exercise: Motor control exercises • Mobilization: Active mobilization exercises • Training: Mobility, coordination, fitness, endurance and strengthening exercises
McKenzie	• Derangement syndrome → Reduction of derangement and maintenance of reduction, recovery of function and prophylaxis. • Dysfunction syndrome → Patient education, postural correction, and stretching of contracted structures. • Postural syndrome → Patient education and postural correction
STarT back	• Low risk → Pain management, advice, stay active, • Medium risk → Advice, stay active, manipulation, stabilizing and/or general exercises to reduce disability, • High risk → Directing management to reduce high levels of fear, anxiety, depressed mood, catastrophizing and distress.

Pregnancy-related low back pain exercises

Literature findings of an exercise program of strengthening abdominal and hamstring muscles showed a significant decrease of pain (Garshasbi et al., 2005). An RCT study of yoga exercise program on pregnant women was aimed at adjusting the joint range of motion, flexibility, strengthening, balance and the mental aspect (Martins & Silva, 2014). Specific exercises have been used for studies by Peterson et al (2012) which were originally used by Depledge et al (2005). These exercises included pelvic tilts, pelvic floor, strength exercises of stability and flexibility. These exercises were followed by three home exercises which included leaning against a wall, knee bends and a stretching exercise for external rotators of the hip (Eggen et al, 2012). Kashanian (2009) indicated the management of acute phase stands for early training as protection phase. It emphasized that a good neutral position of the spine is important and that this can be achieved through proper movements and pelvic tilt, core activation and basic stabilization exercises. Exercises can include arm and leg motions for progressive levels of training. The inclusion of arm and leg motions is reported at the McKenzie method as well. Appendix C gives an overview of the selected articles.

3.2 Interviews

The interview was conducted in English. The interview lasted 30 to 45 minutes. All participants were contacted through email for details of the research and by telephone for further confirmation of the interview. In total ten PTs participated in the interview. They shared their experience and perspectives regarding treating patients with low back pain. Their working experience ranged from 3 to 40 years and the average was 19.5 years. All the PTs are locals except for one that works in a German clinic but received education in the Netherlands. Of the PTs, eight are manual therapists and two are general physiotherapists. The key participants' characteristics are detailed in *Table 3*.

The perception of subgrouping

All PTs agreed that it was necessary to have different groups of people with acute NSLBP. Most of them were aware of KNGF guidelines to give treatments "*Someone who comes in the first week for the pain, can get back to work and do activities, and that's patient profile 1. Pretty normal. Delayed curing, you don't see any improvements within the first a few weeks, then you know there is a yellow flag. Profile 3 is also delayed cure with yellow flags. There are a lot different contributing factors to prevent recovering. Based on those profiles, then I know what my focus on to treat patients is"* [P01].

However, there is no accurate definition of which patient profiles belong to acute phase, as reported by one PT "*These profiles are talking about acute and chronic patients, there is no division between these two groups"* [P01].

Table 3 Characteristics of physiotherapist participants

Number of participant	Specialty field	Years of experience	Gender
P01	Manual therapy	12	Female
P02	Manual therapy	6	Male
P03	Manual therapist/pelvic therapy, pregnant, breathing therapy	38	Female
P04	Manual therapy	40	Male
P05	General physiotherapy	4	Female
P06	Manual therapy	17	Female
P07	General physiotherapy	3	Female
P08	Manual therapy	41	Male
P09	General physiotherapy/ edema therapy/oncology therapy	24	Female
P10	Manual therapy	10	Male
		19.5 (average)	

The way how PTs perceived subgrouping of acute NSLBP was based on their clinical diagnoses. Common cognition of subgroups have been shared by PTs with slight differences due to their practice experience. As participant 05 reported: "*When patients come here, I ask their stories to decide whether they have acute low back pain. Some tests of instability or mobilization problems…there are a lot of reasons. Most of the time it is with instability and mobilization problems"* [P05]. *"If it is stress, overuse, weakness, problems in their head or not, whether they are pregnant…what are their job …*" [P03]. "*Some groups have specific things in their stories, which can be disc or joints problems...Instability as joints blockages, hypomobility of the low back… the mobility is a problem due to joints problems. Overuse as gardening in Saturdays or Sundays, then Monday they got acute pain…*" [P10]. Similarly, participant 02 reported "*instability, stiffness, and work-related problems".* Besides, PTs also perceived a group of patients that had difficult in performing exercises and it could be due to *"For fear of avoidance patients, I just expose them to move on bicycles and walk. Keep them active. If you give specific exercises they will still scare and no use. Currently, we try to make subgroups: flexibility, stability, fear of avoidance*" [P01].

The perception of giving exercises

PTs clarified it was not easy to have standard exercises since treatments were based on individual patient's condition "*No single three or four exercises are good for low back pain patients...*" [P04] and PTs held different strategies to design exercises on patients "*you might have variations with your knowledge on one exercise to avoid boring and keep patients motivated…different weights or with a ball*" [P01].

The majority of PTs noted that giving advice was essential in the beginning along with exercises. Advice was aimed at giving suggestions of proper movements to avoid pain provocation *"I start with a lot of advice, because patients are scared to move around…I told them to change your posture a few times a day, don't do one thing for too long, sit for a few minutes then stand or walk a bit* " [P05]. PTs had a strong favor of walking as a treatment "*walking is the most important…walking actually is the most effective one"* [P01] and *"if walking is a problem, then do smaller steps of walking*" [P02].

In terms of specific exercises, *Table* 4 illustrates an overview of partially retrieved exercises based on PTs clinical experience. Along with sharing specific exercises, PTs also expressed some considerations in relation to giving exercises to patients. From clinical experience, PTs reported that exercises were recommended to perform after less pain or under pain tolerance "*For every exercise, it is important that patients don't get pain during the exercises*" [P05] and "*when pain is decreasing…then you can go further from mobility and strength exercise*" [P02].

Although there were various exercises, a certain sequence of performing a specific type of exercise has been pointed out "*First you do mobilization let the patient know the right movement…Then you can add stabilization exercises*" [P09] and "*Mobility exercise, that's the basic ones and then I will train stability with other exercises"* [P10].

PTs gave common examples of exercises applied in practice as well as specific tactics to perform those exercises in a right way. In addition, PTs named the same exercise with slightly different terms. To achieve different treatment goals, adjusting the level of each exercise has been concerned by PTs "*Then you build up and you use light exercise for extension, lying down on your tummy when you can stabilize then you do plank with hands, make it heavier"* [P09].

PTs acknowledged that some of these exercises were not completely evidence-based "*LBP networking is where I learned things, not sure if it is evidence-based but I saw this is effective on my patients*" [P10] and "*…I am not sure the exercises are studied. Quadruped exercise has been studied, for example, adding arms and legs will be more effective than only arms*" [P02]. Besides, practical experience also developed PTs knowledge "*these exercises are not really proven exercises but based on experience*" [P02].

Table 4 Results of partially retrieved exercises from interviews with PTs

Exercises	Quotes from PTs
Flexibility exercises of rotation, pelvic movements, pelvic tilt, flexion, extension.	"*If you look at acute phase, you just focus on flexibility, you let patients lie down, rotation of the back, from left to right, pelvic movements, flexion ,extension, pelvic tilt, just easy ones to make sure you have flexibility*" [P01]
Pelvic tilt exercise Bridge exercise	"*Pelvic tilt is put your feet on the couch, and I ask patients to put their hands underneath their back to feel the pressure of the low back pain: when you make flexion you feel pressure on your hands which means your, tension on your belly muscles. When extension, the pressure of your hands is gone. This is the easier exercise before you move your pelvic lift up, namely the bridge exercise ,which is way more harder*" [P05]
Strength or stability exercise of superman	"*Pelvic moving is for mobilization and activation the patient, lie on back…that can also be changed into strength exercise or stability … with quadruped position ,very often , and with supine and superman positions*" [P02]
Dynamic exercise of squatting	"*Beginning exercises is static and then dynamic, superman exercises and bridging exercise. Stability and strengthen exercises are combined, later on more dynamic exercises like squatting*" [P10]
Breathing exercise	"*Breathing, relaxing exercises Jakobson method, people are not aware of their own tightness of their muscle. You have to check if they can understand their situation. You start the movement from the hand till the trunk. You get the information and you make your muscle as tight as much you can then relax, you need to know what is tightness and relaxation , it is a cognitive way to treat patients*" [P08]
Stabilization exercise	"*Pregnant needs to train core stability. The first three and second three months put more concentration on the back muscles. Their instability is due to hormones. It is important to avoid the pain and sit with right posture. Stability exercise needs stable place. Relax*" [P02]

Summary

Based on the obtained results, the summarized subgroups and exercises from the interview are displayed in *Figure* 7 *and Figure* 8. The most shared and treatable subgroupings at the acute phase were: stability, mobility, pregnancy-related LBP and psychological or cognitive problems. These subgroups were consistent with the findings from the literature. Pregnancy-related LBP is another special group of several studies, indicating the available treatments included flexibility, strengthening, balance and mental aspect (Martins & Silva, 2014; Garshasbi & Zadehb, 2005). One PT mentioned STarT back screening tool to assess the risk of pain from a cognitive aspect which was also mentioned in literature findings by O'Sullivan et al., (2014). In terms of specific exercises, the highly mentioned mobilization exercises of extension, flexion, rotation and lateral flexion were confirmed from McKenzie method as well (Machado et al., 2005).

Figure 7 Frequency of subgroups of acute NSLBP as reported in interviews

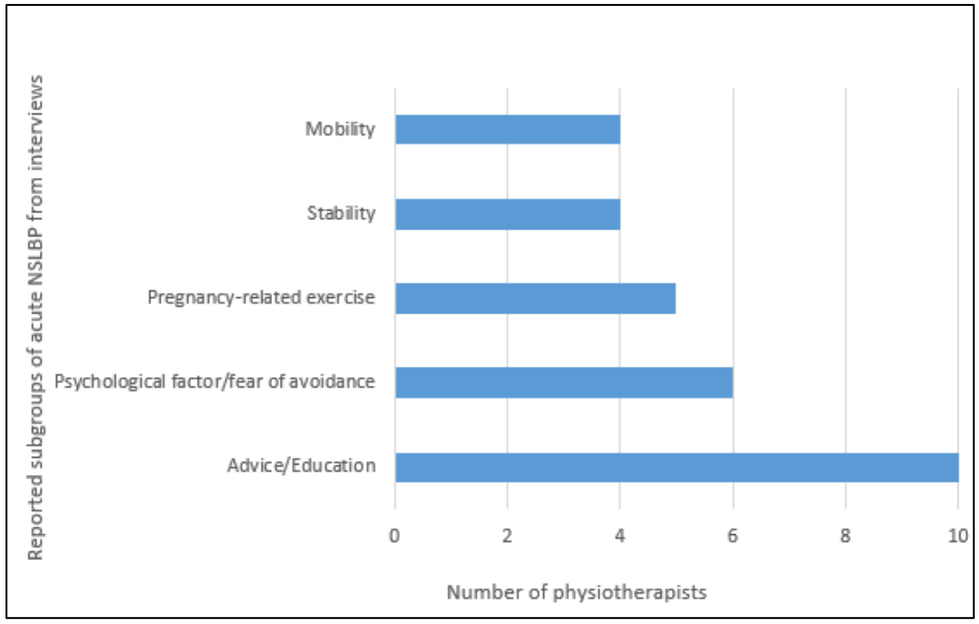
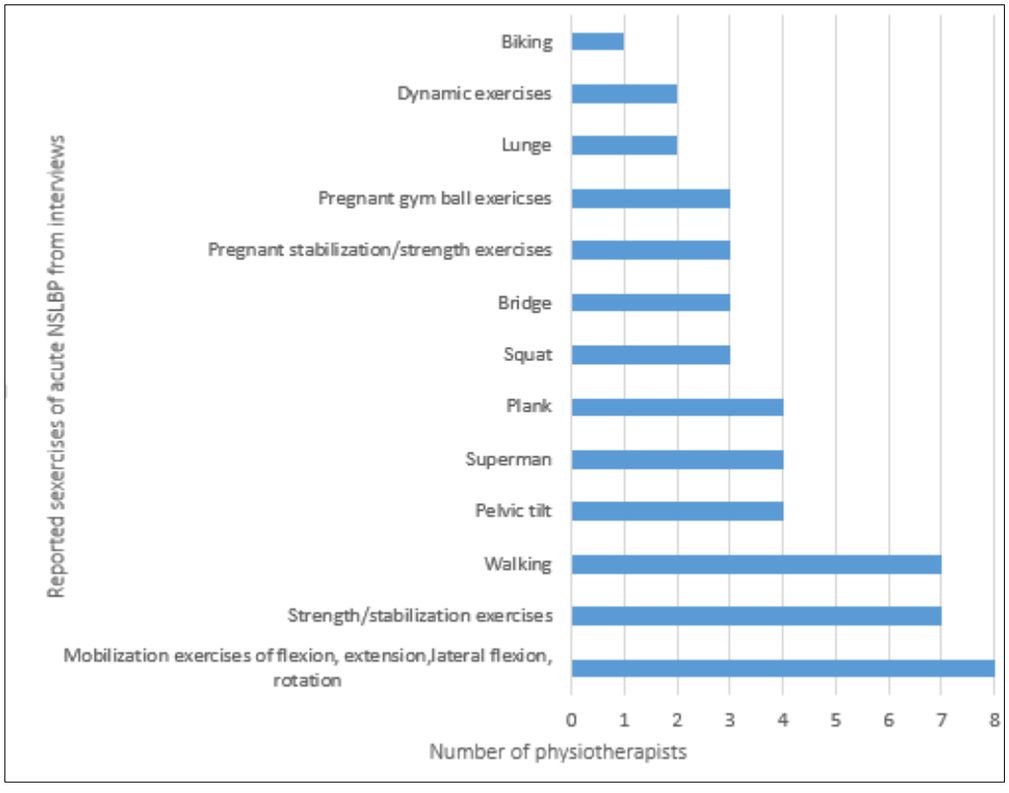


Figure 8 Frequency of exericses of acute NSLBP as reported in interviews



3.3 Synthesis of literature and interviews

Self-care consisted of five parts, as illustrated in *Table* 5. The self-care advice recommended proper movements of daily physical activities to protect and relieve the pain of their lower back. For example, how to sit down, standing up from chair and car and laying down. Appendix D displays the online content of the advice part. The exercises consisted of mobility/range of motion, stability, relaxation and pregnancy-related exercise. Mobility exercises were designed to increase the range of motion of low back which also involved large movements of joints. Stability exercise aimed at improving and strengthening postural stability and deep core stability of abdominal muscles followed by global muscle. Relaxation exercises were performed to feel the sensation of a particular muscle group by contracting and releasing, in order to relax other parts of the body. The exercises for pregnancy-related exercises were focused on stabilization and strengthening deep and global muscles. The videos of each exercise last around one and half minutes, which included verbal guidance in Dutch. Appendix E shows the screenshots of mijntelerevalidatie.nl.

Table 5 Categories on mijntelerevalidatie.nl (in English)

Content	Description
Mobility / Range of motion	Improve mobility in the lower back for better performance of daily activities.
Stability	Improve control and an increase in strength of the muscles in the lower back.
Pregnancy-related exercises	Strengthen and support lower back. This category displayed exercise to improve control and an increase in strength of the muscles in the lower back.
Relaxation	Reduce the muscle tension
Advice, education	This category displayed exercise that focusing on strengthening and support lower back.

Table 6 represents a detailed illustration elements included on mijntelerevalidatie.nl as well as their source of information:

- Exercise 1-7: Mobility/range of motion exercise
- Exercise 8-25: Stabilization exercise
- Exercise 26-27: Relaxation exercise
- Exercise 10-13 and 28-31: Pregnancy-related stabilization exercise
- Elements 32-34: Advice

Table 6 Results of retrieved exercises (in English) and advice with their original information source

Elements on mijntelerevalidatie.nl	Type of Source			Categories on mijntelerevalidatie.nl				
	Literature	Book	Interview	Advice	Mobility / range of motion exercise	Stability exercise	Relaxation exercise	Pregnancy-related stabilization exercise
1. Rotation (standing)			x		x			
2. Rotation (supine)	x		x		x			
3. Lateral flexion (standing)	x		x		x			
4. Extension (standing)	x		x		x			
5. Flexion (supine)	x		x		x			
6. Extension (prone)	x		x		x			
7. Lateral flexion (supine)			x		x			
8. Draw-in /pelvic tilt (prone)		x	x			x		
9. Draw-in /pelvic tilt (supine)		x	x			x		
10. Superman			x			x		x
11. Bridge			x			x		x
12. Squat	x		x			x		x
13. Squat (progressive)	x		x			x		x
14. Lunge			x			x		
15. Plank (knee on the ground)			x			x		
16. Plank (progressive)			x			x		
17. Prone, lift up one leg		x				x		
18. Prone, lift up both legs		x				x		
19. Prone, lift up upper back		x				x		
20. Prone, lift up both legs and arms (upper back)		x				x		
21. Supine, lift up one leg		x				x		
22. Supine, progressive lifting up one leg		x				x		
23. Supine, progressive lifting up one leg		x				x		
24. Supine, lifting up both legs	x		x			x		
25. Supine, lifting up both legs	x					x		
26. Relaxation (lying)	x		x				x	
27. Relaxation (sitting)	x		x				x	
28. Squat (pregnant)								
29. Pelvic floor (with chair)	x		x			x		x
30. Pelvic floor (supine)	x		x					x
31. Leaning forward against wall	x							x
32. Postural correction	x		x	x				
33. Reassurance	x		x	x				
34. Walking	x		x	x				

*Prone: lying on stomach. Supine: lying on back.

3.4 Evaluation

In total, 15 eligible participants were recruited and their characteristics are presented in *Table* 7. The average age of participants was 36.1 years old (SD=14.35). All the 15 participants performed the web-based self-care as well as filled in the questionnaire and joined the interviews. Five of them went through the whole process via skype. The average performance time was around 45 minutes for performing self-care and 25 minutes for interview and questionnaire. Participants had different knowledge of these exercises which influenced the time and the amount of exercises they tried. For example, participant 08 was playing hockey and used to do some similar exercises which made her know what exercises or movements she could get help with. Participants 06 tried almost all the exercises since she had little knowledge of which exercises were best for her.

TAM questionnaires displayed participants rating results. The perceived attitude, PEU and PU were rated relatively higher among other dimensions which can be seen in *Table* 8. PEU was scored at a mean value of 1.87, followed by attitude and PEU with a mean value of 1.71 and 1.70, respectively. A score of 2 implies that participants "zeer mee eens (strongly agree)" with the statements on the questionnaire. While a score of 1 implies that participants "Mee eens (agree)" in terms of intention (μ=1.29), compatibility (μ=0.77), facilitators (μ=1.58) and subjective norms (μ=1.16).

Figure 9 illustrates the number of each exercise "liked most or least" by participants. It shows a wide variation among those exercises. There were four exercises with "like least" and two exercises didn't have any comments. The "like least" exercises which were shown in grey, were relatively heavier and recommended for sportive person. When it comes to the relaxation exercise, the lying position (Exercise 26) gained significant preference from participants, compared to sitting position (Exercise 27). The reason for this could be that there were only two types of exercises under the category of relaxation. The rotation exercise (Exercise 1) and superman (Exercise10) have gained interests among participants.

Table 7 General characteristics of evaluation participants

Variables	
Number of participants	n = 15 (Pregnant n= 3)
Age	36.1 (SD=14.35)
Gender	Female 11 Male 4

Table 8 Descriptive statistics of participants' responses to TAM questionnaire

Dimensions	Minimum	maximum	Sum	Mean	Std. Deviation
Intention	0.00	3.00	19.33	1.2889	.88072
Attitude	.67	2.67	25.67	1.7111	.54724
PEU	.17	3.00	28.17	1.8778	.80046
PU	.83	2.50	25.50	1.7000	.53154
Compatibility	-1.00	1.67	11.33	.7556	.77117
Habits	0.00	2.00	16.33	1.0889	.62319
Facilitators	1.00	3.00	23.67	1.5778	.55587
Subjective norm	-.67	3.00	17.33	1.1556	1.11175

Figure 9 Results of the three "Most liked" and "Least liked" exercises rated by participants

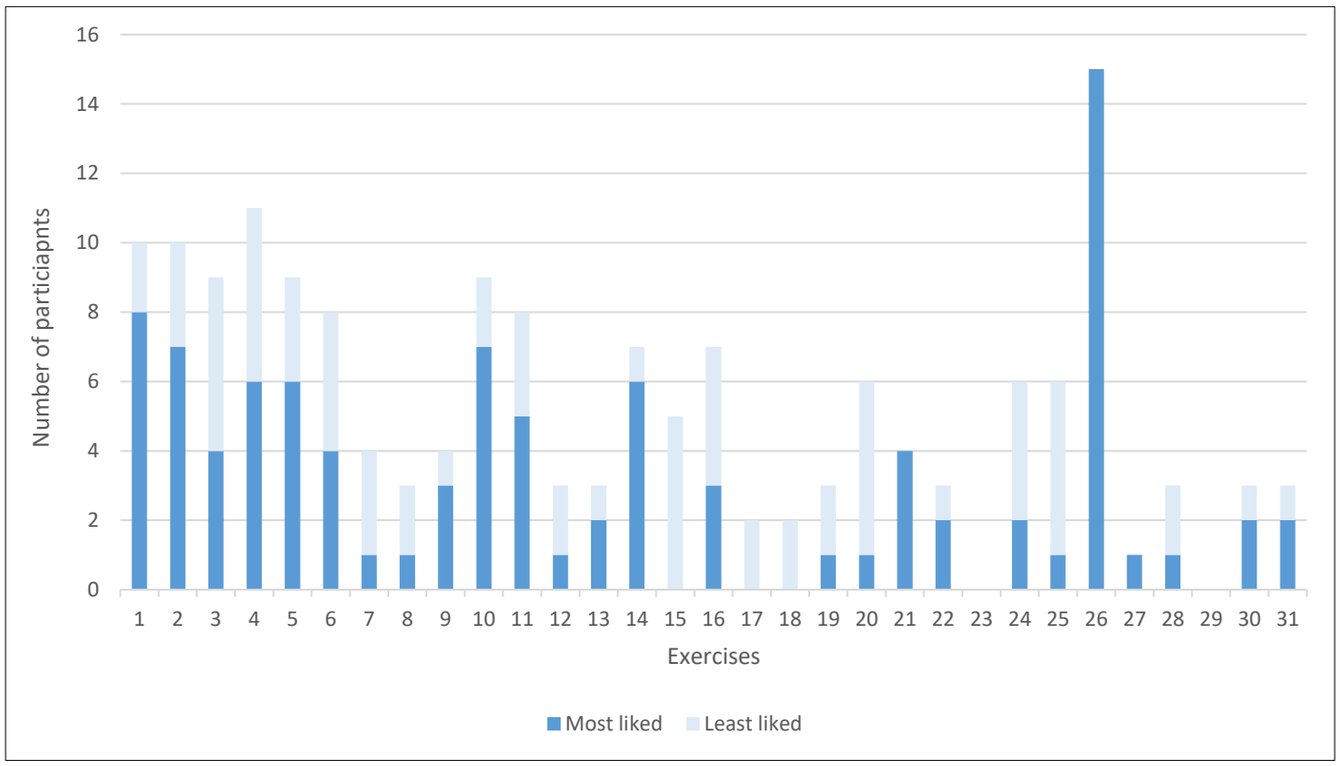


Table 9 "Most liked" and "Least liked" exercises selected by participants

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
E1															
E2															
E3															
E4															
E5															
E6															
E7															
E8															
E9															
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E26															
E27															
E28															
E29															
E30															
E31															

*P1-P15 means the 15 participants who join the web-based self-care evaluation session. E1-E31means the 31 exercises.

From an individual participant point of view, *Table* 9 elaborates the underlying reasons for rated exercises from *Table* 7. The four colors represent participants' main concerns in relation to specific exercises. The space in white means those exercises did not have any comments from participants. For instance, exercise 26 has been chosen by 15 participants which can be read from *Figure* 9 as well. The cell of participant 12 is in blue which indicated that the main reason for choosing exercise 26 is due to its easiness. The rest of participants considered exercise 26 which is relaxing and comfortable.

The orange color indicates the Physical sensation

The green color indicates the Cognitive thinking

The blue color indicates the Level of exercise

The red color indicates the Accessibility of receiving exercise

Physical sensation

The majority of participants expressed the preference of exercise has a strong relation to their own physical sensation since that was a reaction they can tell immediately. All participants showed high preference of exercises which can help in decreasing pain. For example, *"...helping me to relieve my pain, more comfortable..*." [P02], "*I can control and feel less pain...*" [P01], and "*...feel relaxing...*" [P11]. In other words, exercises with pain provocation had little support or were avoided by participants, which was consistent with the recommendation of doing exercise within pain-free range given by the PTs. For example, most participants had least favor of exercises "*causing pain*" [P02, P03, P06, P07, P08,].

Cognitive thinking

As shared by several participants, it was not only their sensation but also the way they value the utility of exercises that dominated their preference. For example, pain was not a definite barrier to decrease participants' interests "*I like it but just I am not able to do it right now with my knee problems*" [P07]. Participants expressed the effectiveness of exercise as another frequently mentioned concern. The perceived effectiveness was either due to their previous experience or the current perception "*I know it that can do well on myself in a long term*" [P09] and "*I know I will get benefits from it*" [P15]. Besides, based on different background and knowledge, participants held open or closed attitudes while performing exercises within tolerant pain to get better or avoid the exercise. Additionally, participants tended to select exercises which were familiar to them as well. With limited knowledge of exercise, participants used common sense to select "*that's also not a normal position I will like*" [P12].

Level of exercise

Most participants expressed their concern that difficult exercises prevent them from getting any help which can lower their interests of practice. Participants showed strong support towards "easy to do" exercises. Subsequently, participants expressed less interests to "*its heavy*" [P01, P07, P08] and "*hard to perform*" [P03] exercises. However, individual participants perceived different utility regarding the level of exercises "*it is heavy but good for my lower back*" [P11].

Accessibility of receiving exercise

It is not only about the level of the exercise perceived by participants, but the basic environment that support the ability to perform the exercise. Half of the participants acknowledged that convenience in terms of place, material and timing of performing those exercises influenced their preference. Especially for those who had full-time work, they preferred exercises which could be integrated into their daily pattern. Awareness of practicing exercise in daily life stays low, which makes the timing of the exercise an essential factor that cannot be ignored. As three participants noted, "*I can do it when I just get up, still in bed...it doesn't fit my daily schedule, this one I really have to think about...*" [P05], and "*I can do it...before going to bed* " [P09,P10]. Exercises that can not only be performed at home but also working place. As two participants expressed "*I can use it during my work*" [P12] and "*can do it with a chair and a table, it is good to do exercise during the day*" [P06]. The duration of performing exercise can be a barrier despite its benefits, as expressed by one participant "*the exercise is comfortable but it takes too long to perform*" [P08].

In general, participants liked the easy and convenient exercises. Most participants showed interests in the way of receiving exercise through this web-based self-care. *Table* 10 and *Table* 11 list the mentioned positive and negative points from participants, respectively. The flexible place and unlimited time of receiving exercises were the most frequently mentioned points by nine participants. For example, it allowed them to do exercises "*at home*" without much equipment "*you can do it very easily and everywhere*" [P11]. This was also consistent with the accessibility, from which participants expressed their interests of selected exercise. The role of web-based self-care

made five participants think they have another choice to receive care. Participant 05 expressed "*don't need to go to family doctors*". However, three participants mentioned that they preferred to use this platform after visiting GPs. The content has been favored by nearly half of the participants "*a video which makes me understand the exercises…not complicated to perform and easy to understand*" [P14]. However, relatively older participants needed repeated times of watching the video and reading the texts to do the exercise. Four participants emphasized that the self-care was good for them and they believed that it brought benefit to them. Three participants requested the real usage of this self-care.

Table 10 Main positive points of self-care on mijntelerelidatie.nl and its frequency

Summarized words	Number of participants (n=15)
No location and time boundaries	9
Videos	6
No need for appointment	5
Personal choice	4
Useful/effective	4
Layout	2
Compatibility	1

Table 11 Main negative points of self-care on c and its frequency

Summarized words	Number of participants (n=15)
Lack of supervision	10
Instructions/content (consistency, sequence)	5
Adherence	3
Layout	2

On the other hand, ten out of 15 participants expressed the uncertainty of lacking of supervision from the beginning and during the performance. For example, one participant reported "I *can make a wrong decision…nobody checks if you do the exercise in the right way*" [P05]. Although the idea of online self-care was supported, the adherence of following the web-based self-care was doubtful by three participants, an example as said *"…it is like you have to have disciplines, everything goes down to your personal drive..."* [P10]. Participants reported the current layout regarding the consistency and sequence of exercise were a bit confusing, such as the instruction in texts and videos of some exercises were not the same and the sequence of exercises. Besides, most participants started watching videos first and reading texts in case they don't understand. As one participant suggested that she would like "*integrating the texts into the video part*" [P06].

4 Discussion

This chapter presents the current findings and justifies the approach to answering the research question and limitations of this research study.

Following a review of the literature on exercises for NSLBP, interviews with PTs and evaluations by participants using mijntelerevalidie.nl, the current study recommends general exercises for participants with acute non-specific LBP as well as found the acceptability among users of self-care via Teleravalidatie.nl before visiting health care professionals. To our knowledge, the present study is the first to focus and explore participants' experience of the web-based self-care at the acute phase of NSLBP prior to visiting GPs or PTs.

No specific studies of subgrouping non-specific LBP at the acute phase were revealed by literature study, but were mixed with chronic and acute phases. Overall, a large amount of articles were excluded. Classification systems were presented in order to match patients with appropriate treatments. Although it has been drawn attention to the importance of classifications, the quality of those existing ones are conflicting and there is no priority among them (Mistry et al., 2014). The findings of this study reveals that PTs preferred categorizing problems based on the mechanism of body functions rather than age groups. The role of PTs is giving physical exercise treatment regarding musculoskeletal problems, and it might influence their point of view to classify subgroups in the way of treatment-based management. In addition, the slightly different perception of subgroupings and exercises treatment might be due to individual physiotherapist's knowledge and clinical experience. As some of the interviewed PTs mentioned that the exercise treatment was learned from their previous education, work experience, colleagues and extra courses. Similarly, exercise programs in previous studies were designed by fitness instructors or PTs, which might lead to different exercises and impacts due to individual knowledge and preferences (Sparkes & Smith, 2014).

Besides, two PTs mentioned their subgroupings of ANSLBP also includes: work-related posture, body structure, overuse and unknown causes, which were not mentioned in the categories found in the literature. These subgroups are more likely related to problems from lifestyle. It may be a topic for future research to classify subgroups of patients in the acute phase, which aligns closer to clinical practice. In terms of specific exercises, limited studies supported and mentioned a particular type of effective exercise for acute non-specific LBP, although more studies have been studied in a chronic phase.

During interviewing, from the physiotherapists' perspective it was hard to summarize common exercises, since treatment was based on the individual diagnosis. They emphasized various reasons: other problematic body structure, psychological problems, or the patients' capability of performing exercises. All of these could make it hard to have a list of common exercises that PTs could give to their own patients. Another reason for the limited availability of information on these exercises can be found in the fact that sharing treatment plans with a third party isn't encouraged. Sparkes & Smith (2014) reported that limitation of retrieving information can come up during interviews.

In general, it seems there is no strict set of standard exercises for patients in the acute phase. The general recommendation is to keep patients active and moving. PTs found it hard to list standard exercises. For instance, one PT with rich experience mentioned all movements were enough to make patients feel better. Less effective results could be due to cognitions, rather than the exercise itself. What found out is that cognitive problems or fear of avoidance have been mentioned quite a lot among PTs, which is in agreement with

Suman et al.,(2015).

It appeared (although not significantly) that the PEU, attitude and PU had the better influence on the acceptance of this web-based self-care. However, the low perceived compatibility on TAM might indicate that most of the participants had little agreement on the web-based self-care could bring extra benefits to the current healthcare system. In terms of this online intervention, its easy access without physical and time limitations were profoundly supported by participants, as well as videos which helped them remember exercises clearly. Everyone could find exercises they preferred within a pain threshold they perceived. The layout of this site was clear for viewing, but the sequence of progressive stabilization exercises should be rearranged from a technical aspect. Plus, participants appeared to have no doubts about its convenience but were more likely to use it under supervision or guidance. This is especially true for those who did not have much experience with physical exercises and preferred confirming with their GP or PT beforehand. Therefore, on one side, web-based self-care offers participants' more choices on selecting exercises, but on the other hand, participants were also not confident of their own choices. The findings of this study also raise concerns on who makes the decision, on which exercises to pick up, and to what extent participants can be sure that exercises are performed correctly. These doubts bring uncertainties to participants using online self-care prior to visiting health care providers. A study from Zufferey & Schulz (2009) had similar results, that the way people use web-based care had strong relation with the individual's previous experience and their ability of self-management.

To critically review the research study, based on the applied methods and results, there are limitations that restrain the interpretation of the presented findings. The primary limitation is being the small sample size, due to low response rate from participants. Related to this, another limitation is the recruitment of study participants for the first interview; nine out of ten of the participating PTs originate from one city, and some of them also joined the local back organization RugNetwerk Twente (RNT). This means they might have different opinions than PTs from other cities in the country, leaving space for selection bias. Another limitation is the interviews were conducted in the English language, which is not the native tongue of either the interviewee or interviewers. This could lead to different responses from an interview performed in the participant's native language. Conducting interviews, collecting and analyzing data was performed by one person, with no second researcher involved. Due to the low response rate of self-selected participants with acute NSLBP, the evaluator of this study not only asked identified participants to deliver this study recruitment message, but also tried to approach people who might have a higher risk of acute LBP. Thus, it might influence the results from the inputs. Five of the participants were sought through personal contact of the evaluator. Different sampling approaches might affect the outcome of the study. Lastly, it was unclear to distinguish the easy and difficult levels in light of the technical design of the sequence of exercises. This could influence the final results of participants' subjective experience of using this service.

5 Conclusion

The current study explored the experience and views of participants with acute NSLBP performing self-care via mijntelerevalidatie.nl. The findings of the evaluation phase pointed out that participants held a positive attitude of using this online self-care. All participants showed their preference of exercises and were able to perform them with the online instructions independently. Exercises which were easy and comfortable to perform have been favored mostly by participants. With the free and easy access, participants' expressed strong interest in using the web-based self-care over time. However, the weak aspects of the self-care revealed it was lacking of supervision or guidance, unclear content and low perceived compatibility from participants. The exercises and advice of the self-care were mainly obtained from physiotherapy clinical practice. The shared exercises were categorized into subgroups due to their function on patients' lower back.

Based on the results, it is suggested to consider and assess "does web-based self-care work" and "will web-based self-care work" in real-life contexts for next steps. Therefore, additional research on evaluating the feasibility and effectiveness of using the web-based self-care by patients diagnosed as acute NSLBP is recommended. Some modifications and adaptations of the self-care can be made, such as a training dosage for individual patients within a normal recovery time of acute LBP.

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Appendix

A: Questionnaire for interviews

Qualitative research –semi-structured questions for interviewing with physiotherapist (PT). In order to get their opinions of relevant self-care exercises.

Themes	Questions	Remark
Professional background		
	1. What is your primary role?	PT in specialization?
	2. In which year you have graduated from your study?	To determine which guidelines have been involved and whether they have updated their information?
	3. What is your specialties?	Whether the professional has more than average knowledge of low back pain.
	4. How many years you have been working as GP or PT?	To define the whether they have more treating experience than others as a whole.
Professional experience and perspective of treating LBP.		
	5. How many patients with low back pain problems you have been diagnosed and treated with on a weekly /monthly basis?	To define whether this will affect their knowledge level of low back pain.
	6. What are the subgroups of low back pain you have been treated with?	To category the types of low back pain, the professional has been worked with.
	7. In terms of giving treatment, which problem you have met more, acute low back pain or chronic non-specific LBP patients?	To define in which case, the PT has more experience and relevant knowledge of giving treatment.
	8. How do you differentiate acute and chronic non-specific LBP in your own experience?	Before giving treatment, how PT knowledge will influence their treatment regimes.
	9. What types of treatment you give to patients with acute / chronic non-specific low back pain (NSLBP)?	While providing treatment, health care professionals has already excluded red flag and yellow flag.
	10. What is the most common treatment you gave to your patients with acute and chronic NSLBP?	Individual professional approaches different intervention.

	11. What are the factors which you think will influence you to make a decision of a specific treatment to your patients?	Such as guidelines / patient's condition, whether professionals will follow the updated guidelines for treatment and consider patients availability for those exercises.
	12. What have you done to maintain your efficient and effective work?	Eg. Professional knowledge updated though joining courses etc.
Exercise-therapy as the main intervention of self-care		
	13. A. Where do you get idea or resources to design exercises? B. Can these exercises be done at home as well?	To define if the exercises is evidence-based or due to working experience preference. To get a specific name of the treatment method or guidelines. The resources is from websites? Books? Papers? Organizations?
	14. How you decide to give exercise treatment in in terms of different age groups or functionality, etc.	Subgroups?
	15. What are the common home exercises / intervention you give to your patients if they are young adults/ old adults/ pregnant with acute and NSLBP? Or they are all the same movements but different frequency, intensity?	To determine if professionals will differentiate the exercise regime for different patient groups and how they will emerge it to self-care exercise. Given the type of exercise, exercise frequency, intensity, and material.
	16. Which training goal you think is the most important in primary care, for each subgroups?	Options: core strength, flexibility, endurance, stay active, stretching.
	17. Although the etiology is unknown and individual, what are the focus training musculoskeletal part in a primary care phase?	Specific muscle groups? Compensated muscle groups as well?
	18. What are the home exercises you found out is effective with your patients but not support from the evidence-based studies yet?	
	19. What are the request/expectations from patients when they visit you to seek help?	To have opinions whether the self-care will help achieve their expectations.
Relevant questions with regard to web-based self-care exercise.	20. When giving exercise therapy, any considerations you want to inform your patients: when giving home-exercise in your clinic directly, compared with patients receive self-care exercises online?	Is instructions will be different than online visual instructions?

	21. How many weeks it take after they feel improvement by receiving exercises?	Will it be the same for all subgroups?
	22. Are there any actions you take to optimize patient's engagement with their exercise treatment when off your clinic? Any obstacles you try to overcome?	Adherence.

B: TAM Questionnaire

Deelnemer nummer	
Leeftijd	
Geslacht	
Werk /studie	
Tijd	

-3 Helemaal mee oneens	-2 Zeer mee oneens	-1 Mee oneens	0 Neutraal	1 Mee eens	2 Zeer mee eens	3 Helemaal mee eens

Intentie （ Intention ）	-3	-2	-1	0	1	2	3
Ik ben van plan gebruik te maken van een online zelfzorgprogramma als deze beschikbaar komt I have the intention to follow the online self-care when it becomes available							
Ik ben van plan om een online zelfzorgprogramma te gebruiken wanneer ik op zoek ben voor hulp met mijn lage rugpijn I think I plan to use the online self-care when I am seeking for help for low back pain.							
Ik ben van plan een online zelfzorgprogramma met regelmaat te gebruiken voor mijn lage rugpijn I plan to use an online self-care program routinely for my low back pain							
Houding (Attitude)	-3	-2	-1	0	1	2	3
Het is een goed idee om on online zelfzorgprogramma te gebruiken om mijn lage rugpijn onder controle te krijgen I think it is a good idea to use the online self-care to solve my low back pain							

Het gebruik van een online zelfzorgprogramma is gunstig for de zelfzorg van patiënten met lage rugproblemen The use of online self-care is beneficial for the self-care of low back pain problems							
Het gebruik van dit online zelfzorg programma zal een positieve impact op mijn leven hebben The use of this online self-care will have a positive impact on my life							
Makkelijk in gebruik (Perceived ease of use)	-3	-2	-1	0	1	2	3
Ik zou deze oefeningen makkelijk onder de knie kunnen krijgen I think that I could easily learn how to practice the online exercise							
Ik denk dat het makkelijk is de taken, die nodig zijn voor het gebruik van een online zelfzorgprogramma, uit te voeren I think it would be easy to perform the tasks necessary for using the online self-care							
Ik denk dat de oefeningen gegeven door een online zelfzorgprogramma duidelijk en makkelijk te begrijpen zijn I believe that the advice/exercises offered in this online self-care are clear and easy to understand							
Ik denk dat dit online zelfzorgprogramma Flexibel is om oefeningen te kiezen I think that this online self-care is flexible to choose exercises							
Ik denk dat het makkelijk is voor mij om vaardig te worden met dit online zelfzorgprogramma I think it was easy for me to become skillful at using the online self-care							
Ik denk dat een online zelfzorgprogramma makkelijk te gebruiken is I think that this online self-care is easy to use							
Ervaren nut (Perceived useless)	-3	-2	-1	0	1	2	3
Het gebruik van een online zelfzorgprogramma zou me kunnen helpen mijn lage rugpijn te monitoren I think that I could easily learn how to practice the online exercise							
Het gebruik van een online zelfzorgprogramma kan mijn lage rugpijn verbeteren I think it would be easy to perform the tasks necessary for using the online self-care							

Een online zelfzorgprogramma zou me kunnen helpen om het optimale uit mijn oefentijd te halen I believe that the advice/exercises offered in this online self-care are clear and easy to understand							
Een online zelfzorgprogramma kan mijn prestaties in het dagelijkse leven ten goede komen I think that this online self-care is flexible to choose exercises							
Een online zelfzorgprogramma is handig om die oefeningen te kunnen selecteren die mijn voorkeur hebben I think it was easy for me to become skillful at using the online self-care							
Het online zelfzorgprogramma maakt het gemakkelijker om thuis oefeningen te doen I think that this online self-care is easy to use							
Compatibiliteit (Compatibility)	-3	-2	-1	0	1	2	3
Het gebruik van het online zelfzorgprogramma biedt mij extra hulp bij mijn lage rugpijn The use of the online self-care may give extra help for my low back pain							
Het gebruik van een online zelfzorgprogramma kan zorgen voor goede primaire zorg The use of online self-care may bring good primary care							
Het gebruik van een online zelfzorgprogramma kan botsen met de gebruikelijke manier waarop ik hulp zoek voor mijn lage rugpijn The use of this online self-care may interfere with the usual way of care seeking							
Gewoontes(Habits)	-3	-2	-1	0	1	2	3
Ik kan goed overweg met informatie- en communicatietechnologieën I feel comfortable with information and communication technologies							
Ik heb al eerder gebruik gemaakt van een online zelfzorgprogramma (oefeningen of advies) voor hulp bij mijn lage rugpijn I have already used similar online self-care (exercises/advice)to seek help for my low back pain							
In het dagelijks leven maak ik vaak gebruik van de computer In everyday life, I often use computing tools in my life							
Ondersteuning (Facilitators)	-3	-2	-1	0	1	2	3

Thuis heb ik het benodigde internet en de benodigde computer om het online zelfzorgprogramma te kunnen gebruiken I think that my home has the necessary internet and computer to support my use of the online self-care							
Ik zal een online zelfzorgprogramma gebruiken als ik een passende behandeling krijg I would use this online self-care if I receive appropriate treatment							
Ik zou dit online zelfzorgprogramma gebruiken mits ik de noodzakelijke technische assistentie krijg I would use this online self-care if I receive the necessary technical assistance for the website.							
Subjective standaardmaat(Subjective norm)	-3	-2	-1	0	1	2	3
Mensen zullen er open voor staan dat ik gebruik maak van een online zelfzorgprogramma People will welcome the fact that I use the online self-care							
Mijn vrienden en familie zullen blij zijn als ik dit online zelfzorgprogramma ga gebruiken My doctor would welcome the fact that I use this online self-care							
Andere zorgverleners (verpleegkundigen, andere specialisten e.a.) zullen open staan voor het het feit dat ik gebruik maak van een online zelfzorgprogramma Other health professionals(nurses, other specialists et al.) would welcome the fact that I use this online self-care							

C: Characteristics of included articles

Author &year	Study design	Characteristics patient group	Intervention	Measurement	Results/ main findings
Eggen et al, 2012	RCT	Pregnant woman Intervention group: 129 Control group: 128	**Intervention group :** Participants, tailored supervised group exercise once a week ,information and home exercise. The exercise aims at training stabilization of lumbopelvic, body awareness, posture, ergonomic advice of daily activities. Muscle of pelvic floor ,transvers abdominal muscles. Group training: 20-30 minutes of aerobic training: stepping, walking, or light jogging on a BOSU* balance ball. knee bends, toe raises, and pelvic floor-muscle contractions in couples. 4 stabilization exercises Intervention took place for a maximum of 16 weeks, between 20 to 36 weeks' gestation, with no follow-up after 36 weeks' gestation. **Control group:** Usual prenatal care.	Pain intensity in the morning and evening, disability, SF-8, PCS, and MCS	Supervised exercises in groups didn't reduce the prevalence of LBP or PGP.
Garshasbi et al, 2005	RCT	107 pregnant women in exercise group 3 times a week during second half of pregnancy for 12 weeks. 105 pregnant women in control group	Exercise group focused on strength training of abdominal muscles, hamstrings, traction of llioposaos and para vertebral muscles. 15 movements in 60 min as a whole program : 5 minutes of slow walking, 5 minutes of extension movements, 10 minutes of general warming up, 15 minutes anaerobic exercise, 20 minutes of specific exercise, 5 minutes return to the 1st position - offered to exercise 3 times a week - supervised by midwife. Exercises was recommended by pts Control group: does not receive these exercises, usual prenatal care.	Pain intensity: KEBK questionnaire (Iranian version of Quebec Questionnaire for assessing pain; range 0 to 100, higher = worse pain). Flexibility of spine :side bending test Lordosis: flexible ruler Outcomes assessed after 12 weeks.	Exercise group has significant pain relieving and effect on flexibility of spine, but no effect on lordosis
Kashanian 2009	RCT	Pregnant with low back pain. Intervention 15 Control 15	Intervention group: 7 exercises and relaxation movements .Each exercise session lasted 30 minutes x 3/week , in total of 8 weeks. Exercise included walking, stretching (spine extensors from standing to squatting position, hamstrings in wall stretch method, thigh adductors in lowering down knees, lumbar paravertebral muscles in prayer position), strengthening(thigh extensors in pelvic tilt or quadruped/cat-camel exercise and abdominal oblique in side rolling exercise) x 21 minutes, relaxation x 4.5 minutes Control group: routine prenatal care/usual care	RMDQ lumbar lordosis: flexible ruler	Interventional group showed significant difference in less back pain after 2 months.
Machado et al., 2010	RCT	73 patients in the first-line care, 73 patients in McKenzie method. Patients with a new episode of acute non-specific low back less than 6 weeks.	Control group of First line care of advice to remain active and to avoid bed rest, reassurance, acetaminophen. Intervention group of first line care and McKenzie exercise: encourage directions of movement and postures that produced centralization of pain	pain (0-10 Numeric Rating Scale) over the first seven days, pain at 1 week, pain at 3 weeks and global perceived effect (-5 to 5 scale)	No significant difference between groups on global perceived effect, disability, function. Intervention group showed less additional health care seeking.

Peterson et al, 2012	RCT Pilot	Pregnant with low back pain during pregnancy Exercise group:22 spinal manipulation:15 Neuro Emotional Technique:20	Exercise Group : booklet, pelvic tilts, pelvic floor, gluteus maximus, latissimus dorsi, and hip adductor Strengthening exercises to promote low back stability and flexibility. abdominal stabilization Home advice for right posture and movements Spinal manipulation of chiropractic Techniques : high velocity, low amplitude thrust applied to isolated joint to move it high velocity, low amplitude thrust applied to isolated joint to move it Neuro Emotional technique : chiropractic mind-body technique	RMDQ Pain -Numeric Rating Scale. VAS	Spinal manipulation and exercise had slightly better improvement in function and pain relieving than Neuro Emotional Technique
Martins & Silva, 2014	RCT	Yoga intervention group 30 Educational control group 30	Yoga intervention group: joint range of motion, flexibility, strengthening, muscular resistance, balance, stimulation, mental relaxation. Educational control group: control postural orientation group.	VAS	Yoga method was more effective at reducing pain

**VAS: visual analog scale; LBP: low back pain. PGP: pelvic girdle pain. SFA: solution-finding approach. GPE: globale perceived effect. PSFS: patient-specific functional scale. RMDQ: Roland morries questionnaire. SF-8: 8-Item Short-Form Health Survey, PCS: Physical Component Summary, MCS: Mental Component Summary scores*

D: Advice for self-care on mijntelerevalidatie.nl (In Dutch)

Advice

- Neem de eerste twee dagen rust en leer om de pijn te accepteren.
- Pijn tijdens het bewegen betekent niet dat u iets beschadigt.
- Het is veilig om te oefenen en te werken wanneer u rugpijn heeft – u zult zich alleen de eerste paar dagen moeten aanpassen qua fysieke activiteit.
- Wees niet ongerust, er is niets echt mis, maar blijf bewegen om stijfheid en verergering van het probleem te voorkome
- Blijf niet te lang zitten en probeer meer te wandelen.
- Ga bewegen: buig, sta of lig in plaats van zittend TV kijken.
- Bewegingen zullen in het begin pijn doen, maar dit zal beter worden wanneer u blijft bewegen. Bijvoorbeeld door, af te wassen of kleren in of uit de wasmachine te halen.
- Neem de eerste twee dagen rust en leer om de pijn te accepteren.

Awareness of safe postures and symptom relieving advice	
Passieve houding voor het verminderen van de klachten.	Buig-voorkeur: in ruglig met een kussen onder de lage rug; zittend met een klein voetenbankje om de voeten te ondersteunen; staand met hulp van een kleine stoel onder de voet. Strek-voorkeur: in ruglig strekken van de benen voor een strekking van de wervelkolom; in buikligging zonder kussen voor een strekking van de wervelkolom; zittend met een kussen bij onderrug of opgerolde handdoek voor een verdere strekking; staand voor een strekking.

Oefeningen en advies voor zwangeren met rugpijn

Het is van groot belang dat u de spieren van uw bekkenbodem en onderste buikspieren aanspant tijdens de volgende activiteiten:

Wanneer u naar bed gaat:

Ga zitten op de rand van het bed, houd de knieën dicht bij elkaar en ga op uw zij liggen, zodat u uw beide benen zijwaarts omhoog tilt. Doe dit omgekeerd wanneer u uit bed komt.
Probeer uzelf niet op te tillen wanneer u op uw rug ligt.

Bij het draaien in bed:

Houd uw knieën bij elkaar.
Draai niet om met uw knieën uit elkaar.

Bij het opstaan uit een stoel:

Houdt uwe knieën dicht bij elkaar, plaats uw handen op uw knieën en buig met uw hoofd en romp naar voren tijdens het opstaan.

Bij het gaan zitten:

Doe het gekeerde tijdens het gaan zitten.
Weet zeker dat u de stoel voelt wanneer u gaat zitten.

Bij het instappen in een auto.

Ga eerst zitten en zwaai dan de benen naar binnen, houd hierbij de knieën bij elkaar.

Tijdens het lopen:

Neem kleinere stappen.

Bij het traplopen:

Ga met zijwaartse stappen de trap op, stap voor stap.
Indien mogelijk, vermijd traplopen

Denk aan:

Slaap met een smal kussen tussen uw benen.
Neem rust pauzes.
Beweeg alleen binnen de pijngrens.

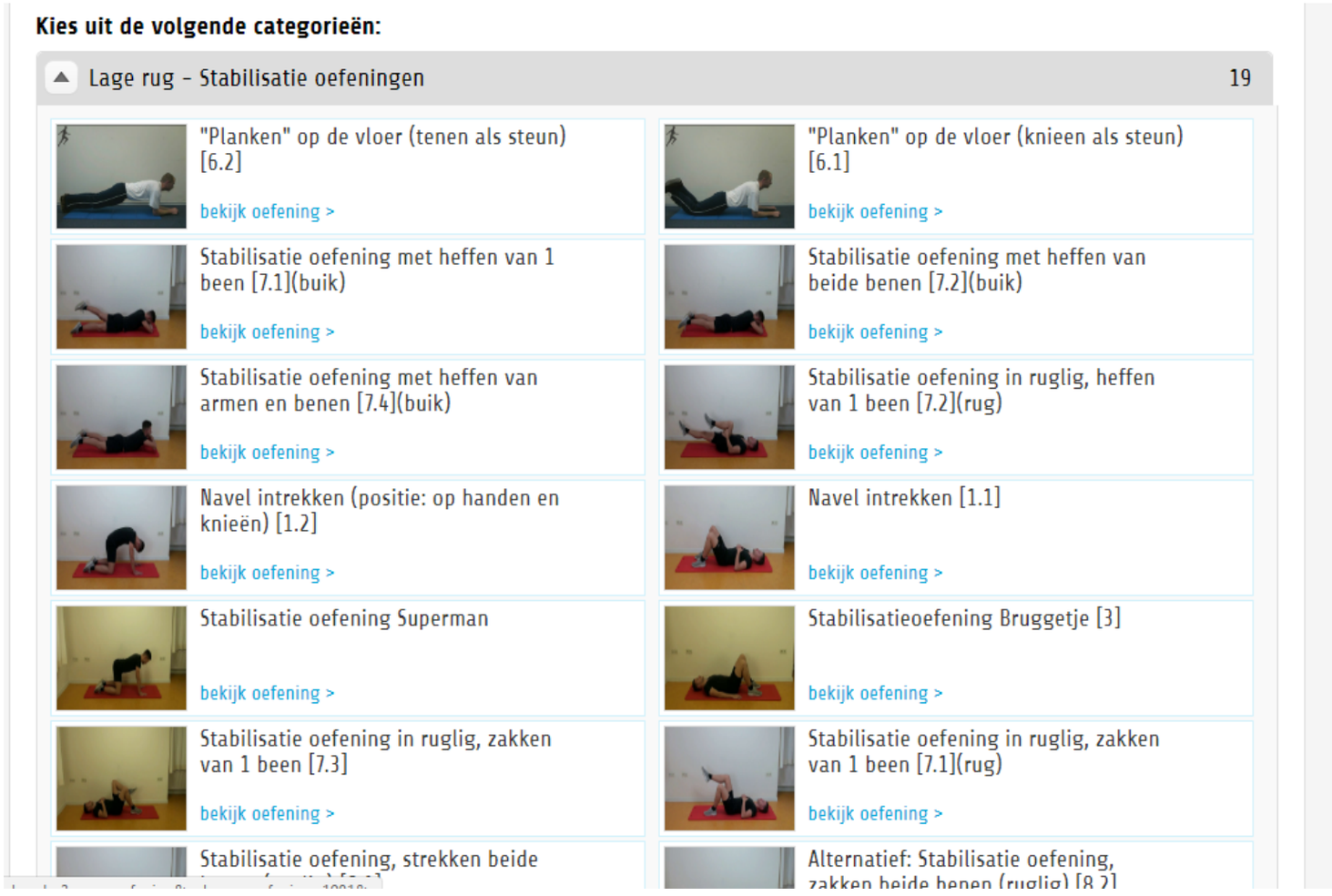
Vermijd:

Zitten op zachte banken en stoelen.
Lopen als oefening.

Actief rekken en oefenen met de benen uit elkaar (bv. squatten, zitten met benen over elkaar of de schoppende beweging die wordt gemaakt tijdens zwemmen.

E: Screen shots of mijntelerevalidatie.nl

Screen shots of mijntelerevalidatie.nl after uploading exercise (from top to bottom): login in site, categories of self-care, exercise session.



Screenshot of exercises under category of stabilization traning.