

JYU DISSERTATIONS 189

Eira Karvonen

Physiotherapy for Low Back Pain Clients in Direct Access Practice

Competences and Implementations



UNIVERSITY OF JYVÄSKYLÄ
FACULTY OF SPORT AND
HEALTH SCIENCES

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*To Lissu, Vesa, Arttu ja Leo
You don't learn to swim by reading;
you have to get in the water*

ABSTRACT

Karvonen, Eira

Physiotherapy for Low Back Pain Clients in Direct Access Practice: Competences and Implementations

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Although previous research conducted in Finland and other countries has shown direct access in physiotherapy to be an important method in preventing the recurrence of low back pain (LBP), data are still lacking on the level of required competences of physiotherapists, suitable classifications of LBP and the implementation of direct access practice after a continuing education program for physiotherapists.

The purpose of this study was to examine two areas: physiotherapists' core competences in direct access practice for LBP clients in the early phase of pain using tissue-structural classification, and the implementation of this practice after a continuing education program with clients' and physiotherapists' experiences.

Participants consisted of 34 physiotherapists and 80 low back pain clients from public health care organizations in southern Finland. Data were collected from questionnaires, interviews and by physiotherapists' reports of their clients. Both quantitative and qualitative methods were used when analyzing the data.

The results showed that the physiotherapists' core competences of clinical reasoning and critical reflection were on a good level when used with tissue-structural classification and the hypothetico-deductive method in the assessment of low back pain clients. Physiotherapists made constantly accurate diagnostic subgroups for their LBP clients. The agreement percentage between the physiotherapists and two reviewers was 74% (kappa 0.63; 95% CI, 0.47 to 0.77). Physiotherapists also analyzed their clinical reasoning systematically from their clients' history to their choice of clinical tests and conclusions. They were able to justify their manual skills and the adequacy of the LBP classification in use and suggest other alternatives for their performance. Most of the clients (80%) were satisfied with the implementation of direct access physiotherapy in the early visit to a physiotherapist and with the information and advice they received. Three months after the physiotherapy visit, repeat visits were on a low level and only one of the employed people was on sick leave. The physiotherapists reported having felt their work to be meaningful which, according to a qualitative analysis, was connected with client satisfaction, reasonable division of labor, cooperation with their co-workers and an increase in professional appreciation.

This research demonstrates the benefits, as outlined by clients and physiotherapists, of direct access to physiotherapy in the early phase of LBP as well as the use of tissue-structural classification (nociceptive pain mechanism) as one of the classifications in this stage. Clinical reasoning and critical reflection competences in the assessment of clients were shown to be important during the subclassification of LBP clients and during the evaluation of physiotherapists' own performance. Continuing learning of these competences should also be included in education programs. The results of this research can be utilized in physiotherapists' direct access practice as well as when planning the content of the education program for the practice.

Keywords: LBP-classification, clinical reasoning, critical reflection, core competences, direct access

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TIIVISTELMÄ (FINNISH ABSTRACT)

Karvonen, Eira

Selkäkipuasiakkaan fysioterapia suoravastaanottotoiminnassa. Osaamista ja toteutusta

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Suomessa ja muualla tehdyt tutkimukset ovat osoittaneet fysioterapeuttien suoravastaanoton olevan yhtenä tärkeänä keinona selkävun pitkittymisen ehkäisyssä asiakastytyväisyyden ja tehokkaan työnjaon näkökulmasta tarkasteltuna. Useista tutkimuksista ja hoitosuosituksista huolimatta edelleen puuttuu tietoa fysioterapeuteilta vaadittavasta osaamisesta suoravastaanotossa, sopivan selkäkipuluokituksen käytöstä ja suoravastaanoton implementoinnista käytäntöön asiakkaiden ja fysioterapeuttien kokemuksina.

Tämän neljästä osajulkaisusta koostuvan tutkimuksen tarkoitus oli selvittää toteutetun lisäkoulutuksen jälkeen fysioterapeutin ydinosaamisen: kliinisen päättelyn ja kriittisen reflektoinnin siirtymistä käytäntöön sekä selkäkipuasiakkaiden ja fysioterapeuttien kokemuksia suoravastaanotosta. Tutkimukseen osallistui yhteensä 34 fysioterapeuttia ja 80 selkäkipuasiakasta julkisen terveydenhuollon organisaatioista Etelä-Suomesta. Kliinisen päättelyn tarkasteluun valittiin opetuksessa käytetty kudos- ja rakennetason alaselkäkipuluokitus ja hypoteettis-deduktiivinen päättelymalli. Tietoa kerättiin fysioterapeuttien asiakaskirjauksilla, haastatteluilla ja kirjallisilla kyselyillä. Tiedon käsittelyssä käytettiin sekä määrällisiä että laadullisia menetelmiä.

Tulokset osoittivat, että fysioterapeutin kliininen päättely ja kriittinen reflektointi tapahtui hyvällä tasolla käyttäen selkävun kudos- ja rakennetason luokitusta ja hypoteettis-deduktiivista päättelymallia. Yksimielisyysprosentti selkäivun alaluokista oli fysioterapeuttien ja kahden arvioijan välillä 74% ja Kappa=0,6 (95%CI; 0,47-77). Fysioterapeutit myös analysoivat kriittisesti ja reflektoivat valintojaan ja johtopäätöksiään. He arvioivat manuaalisia taitojaan kliinisten testien suorittamisessa ja käytetyn selkävun luokituksen sopivuutta asiakkaidensa tutkimisessa. Fysioterapeutit esittivät myös muita vaihtoehtoja toteutukseensa. Asiakkaat olivat tyytyväisiä fysioterapeuttien suoravastaanottoon. He kokivat saaneensa selityksen selkäkipunsa mahdollista syistä ja mitä he itse voisivat tehdä kivulleen ja sen uusiutumisen ehkäisemiseksi. Kolme kuukautta fysioterapeutilla käynnin jälkeen uusintakäynnit olivat vähäisiä ja vain yksi työssäkäyvistä oli sairauslomalla. Fysioterapeutit kertoivat työn mielekkyyden kokemuksesta, joka liittyi asiakkaiden tyytyväisyyteen, toimivaan työnjakoon ja yhteistyöhön toimipaikoissa sekä ammatillisen arvostuksen lisääntymiseen. Yhteenvetona voidaan todeta, että fysioterapeuttien suoravastaanotto on hyvä toimintatapa sekä selkäkipuasiakkaiden, että fysioterapeuttien näkökulmasta arvioituna. Selkävun varhaisvaiheessa kudos- ja rakennetason kipuluokitus on luotettavasti sovellettavissa käytäntöön fysioterapeuttien jatkokoulutuksen jälkeen. Fysioterapeuttien ydinosaamisessa kliininen päättely ja kriittinen reflektio ovat tärkeitä taitoja fysioterapeutin suoravastaanottotoiminnassa. Näiden taitojen jatkuva kehittäminen tulisi sisällyttää fysioterapeuttien jatko- ja lisäkoulutuksiin. Tutkimuksen tuloksia voidaan hyödyntää fysioterapeuttien suoravastaanottotoimintaan sekä tähän liittyvien lisäkoulutusten suunnitteluun.

Avainsanat: alaselkäivun luokittelu, kliininen päättely, kriittinen reflektio, ydinosaamiset, suoravastaanotto

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This research journey would not have been possible on my own, without my patients, colleagues and co-authors. The journey started four decades ago in my work as a physiotherapist. I started to wonder why I was seeing so many patients with low back pain which had lasted for years with many negative consequences. I realized that something must be wrong in our health care system. Patients were not in the right place at the right time. Together, I and my colleagues Markku Paatelma (PT, PhD) and Jouko Heiskanen (PT, MD,) decided we wanted to make changes.

Our first step down this path was a study we conducted in 1990 regarding the reliability of PTs' clinical examination of LBP clients. This was followed by a pilot study of PTs' direct access practice in Central Finland, in a municipal health care center in Palokka together with enthusiastic physiotherapists. Inspired by the good results, we wanted to carry on our journey in the field of research. At the beginning of 2000, Markku Paatelma and I each started our PhD studies in physiotherapy for LBP patients with the aim of achieving changes in our health care system. Markku Paatelma finished his doctoral research in 2011. I was concentrating on PTs' direct access practice for LBP clients in the early phase of pain (< 3 months). Now, when my dissertation is complete, it is time to share my gratitude with all of you who have been with me during this interesting research journey.

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Jyväskylä, 31 January 2020
Eira Karvonen

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LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the following original publications, which will be referred to by their Roman numbers

- I Karvonen E, Paatelma M, Kesonen J-P, Heinonen A. 2015. Knowledge translation from continuing education to physiotherapy practice in classifying patients with low back pain. *Journal of Manual and Manipulative Therapy* 23 (2), 68-74.
- II Karvonen E, Paatelma M, Laitinen-Väänänen S, Piirainen A. 2017. Clinical reasoning and critical reflection in physiotherapists' examinations of patients with low back pain in its early phase: A qualitative study from physiotherapists' point of view. *European Journal of Physiotherapy* 19 (4), 185-193.
- III Karvonen E, Paatelma M, Heinonen A. 2017. Asiakkaan kokemuksia fysioterapeutin suoravastaanotosta selkäkipujen varhaisvaiheessa. Retrospektiivinen kuvaileva kyselytutkimus. *Kuntoutus* 40 (3-4), 3-11.
- IV Karvonen E, Laitinen-Väänänen S, Paatelma M, Roine M, Heinonen A. 2019. Physiotherapists' experiences of direct access for clients with musculoskeletal pain and dysfunction: a qualitative study. *European Journal of Physiotherapy* DOI: 10.1080/21679169.2019.1636133

In all original publications Eira Karvonen had the main responsibility of all phases as the first author. Data collection in Study I, Study III and Study IV was carried out together with the responsible person in the participating health care organizations. The interviews in Study II were planned and carried out by the first author. Questionnaires in Study III and IV were planned together with other authors and delivered by the responsible person in the health care organizations. The statistical analysis in Study I and Study III was carried out together with Markku Paatelma and prepared at the Student and Academic Services, Statistical Advisory. Data analysis of interviews in Study II and of answers for open questions in Study IV was carried out together with Sirpa Laitinen-Väänänen. The writing process and submissions of the articles were Eira Karvonen's responsibility Ari Heinonen served as supervisor in all phases in Study I, Study III and Study IV. Arja Piirainen was supervisor in Study II. The final thesis was supervised by Sirpa Laitinen-Väänänen and Ari Heinonen.

ABBREVIATIONS AND DEFINITIONS

CI	Confidence interval
CR	Clinical reasoning
ICF	International classification of functioning, disability and health
k	Kappa
LBP	Low back pain
MRI	Magnetic resonance imaging
MSD	Musculoskeletal disorder
NSLBP	Non-specific low back pain
PT	Physiotherapist
WCPT	World confederation of physiotherapy

Physiotherapy is the health profession with expertise in movement and exercise prescription throughout the lifespan across the health spectrum. Physiotherapy involves specific interventions to individuals and populations where movement and function may be, threatened by disease, ageing, injury, pain, disability, disorder or environmental factors. Such interventions are designed and prescribed to develop, restore and maintain optimal health. (Finnish Association of Physiotherapists 2018).

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ORIGINAL PAPERS

1 INTRODUCTION

Several studies have shown that early management of non-specific low back pain (LBP) prevents both the development of chronic pain and prolonged sick leave (Wand et al. 2004; Butler et al. 2007; Savigny et al. 2009; Nicholas et al. 2011; Steffens et al. 2016; Fritz et al. 2017). In many countries, early LBP management is emphasized when training physiotherapists (PTs) for direct access, including in Great Britain, the Netherlands, Norway, Finland, the USA, Canada, and Australia (WCPT 2013). The results of surveys and studies for early PT management of patients with LBP have been positive, from the patients' point of view as well as in the costs associated with return to work (Börnhof et al. 2019). For the past few decades in Finland, a continuing education program in direct access has been available, including reports (Aalto et al. 2018; Töytäri 2019) and unpublished studies about the practice. The guidelines for this education have been established in Finland at the end of 2017 (Finnish Association of Physiotherapists). The surveys and studies have shown good success with PTs' direct access not only in terms of cost benefit (Ojha et al. 2014, Börnhof et al. 2019), but also in the functional division of the work in primary health care (Börnhof et al. 2019; Downie et al. 2019). However, there is still a lack of studies about the competences PTs need in direct access practice, suitable classifications of LBP, and the implementation of the content in practice after a continuing education program. To fill this gap, this study is conducted about PT's core competences, suitable classifications of LBP in direct access practice and clients' and PTs' experiences of the implementation of this practice after a continuing education program.

2 LOW BACK PAIN

Musculoskeletal disorders (MSD), which are the second most common reason for disability after mental health and substance abuse, has a global effect on pain and disability, while low back pain is the most common MSD (Hartvigsen et al 2018). The prevalence of chronic LBP has risen significantly, with continuing high levels of disability and health care use. A substantial portion of the rise in LBP costs over the past 2 decades may be related to this rising prevalence (Freburger et al. 2009). According to the Health 2011 study, the incidence of LBP in Finns has increased. Back pain was felt in the previous 30 days in 41% of women and 35% of men. From 2000, LBP increased slightly, both in males (from 30% to 35%) and in women (from 37% to 41%), most between the ages of 30 to 54 years. In 2012, Finland lost a little over 2.1 million days of sickness allowance due to back pain, with costs amounting to EUR 119.8 million. In the same year, invalidity retirement due to LBP was 26,600 people and the cost of invalidity pension amounted to EUR 346.6 million (Finnish Institute of Health and Welfare 2011, updated 31 May 2018). To address this issue, several types of management have been recommended to improve care for LBP clients. The European guidelines for the management of LBP recommend a diagnostic triage to exclude specific spinal pathology, and an assessment of prognostic factors to maximize the benefits of treatment and to avoid unnecessary over- or under-treatment (Weiser & Rossignol 2006). LBP has generally been divided into two groups: specific LBP and nonspecific LBP. Non-specific low back pain (NSLBP) is diagnosed when there is no serious illness or trauma such as vertebral fracture, a tumor, osteoporosis, ankylosing spondylitis, or cauda equina syndrome, all of which could be identified with imaging techniques (e.g., MRI, X-rays; Weiser & Rossignol 2006). Another generally used sub-classification applied is by duration of LBP: acute pain lasting less than 6 weeks, subacute pain from 6 to 12 weeks, and more than 12 weeks for chronic or persistent pain (Marin et al. 2017). In the present study, acute and subacute pain have been called early phase of pain (< 12 weeks). Besides these, other classifications are needed for clinical practice in the examination and management of LBP. (See 2.2 classification of LBP).

2.1 Pain mechanisms

Low back pain, and also classifications of LBP, can be more comprehensive if we understand pain mechanisms. LBP often consists of under-recognized pain components, which can be challenging to manage, and requires improved understanding and better diagnosis and treatment. Increased recognition and improved understanding of these components raises the potential for the development of pain mechanism-based therapies (Baron et al. 2016).

In the early phase of back pain, pain can be understood via the nociceptive pain mechanism caused, for example, by the damage or overloading of tissues and structures (muscles, ligaments, joints, intervertebral discs, nerves). Peripheral stimulus is experienced in the central nervous system, in the brain. This stimulus can be experienced in different ways even if the source is same. Reasons for different experiences can be due to client's earlier experiences of pain, thoughts and beliefs (Kalso 2002). As has been emphasized, pain is a complex sensory and emotional experience. It is more than just a signal of tissue damage (Kalso 2002). The complexity of pain grows over time. In chronic back pain, the time from pain experience causes a sensitization of the central nervous system and pain can still be experienced even if the original source of pain can no longer be determined (Waddell & Burton 2005). Chronic pain can also develop through the continued evolution of damage in tissues as neuropathic pain, such as in complex regional pain syndrome (Vainio 2002). For these reasons we need different classifications for NSLBP in its early phase (<12 weeks) and for pain in its chronic phase (>12 weeks) in clinical assessment and physiotherapy.

2.2 Classifications of non-specific low back pain

Classifying clients with NSLBP into meaningful subgroups should aid in clinical management and increase the power of outcome assessments. This is why such a classification has been targeted as an important research priority. This has led to an emphasis on classifying LBP clients into homogeneous subgroups, an effort that has been called one of the biggest challenges in physiotherapy (Dankaerts et al. 2006).

The survey by Kent and Keating about whether NSLBP is a single condition was conducted among 1,093 primary care clinicians. Ninety-three percent of them claimed that they treat NSLBP differently based on patterns of signs and symptoms (Kent & Keating 2005).

There are currently many classification systems for chronic NSLBP. Some of them are descriptive, some prognostic, and some attempt direct treatment. Fairbank et al. (2011) state that there are no classification systems which could be adopted for all purposes. They further recommend that future efforts in developing a classification system should focus on one that helps to direct both surgical and nonsurgical treatments (Fairbank et al. 2011).

According to the literature, physiotherapy has five principal LBP classification systems that also fit in the early phase of LBP. These systems attempt to match treatments to subgroups of patients using a clinically driven decision-making process:

1. The mechanical diagnosis and therapy classification model described by McKenzie (Hefford 2008). The centralization phenomenon has been reported to be a key physical examination finding in the classification, evaluation, and management of patients with spinal impairments (Donelson et al. 1997; Werneke et al. 1999; Razmjou et al. 2000; Werneke & Hart 2003; Long et al. 2004; Donelson et al. 2012). The reliability and validity of the McKenzie classification system has been tested (Kilpikoski et al. 2002; Clare et al. 2005). This system was shown to be reliable in LBP sub-grouping classification for suitably trained examiners, but not for minimally trained or untrained assessors. There is some evidence that the McKenzie method is more effective than advice only for acute and subacute LBP (Paatelma et al. 2008).

2. The movement system impairment syndromes model described by Sahrman (2002, 1-108). The classification proposes five categories based on the findings from a standardized examination. Although several case reports involving treatment using the concept of movement system impairment syndromes have been published, the efficacy of this classification has not been tested in randomized controlled trials, except in people with chronic low back pain (Sahrman et al. 2017).

3. The mechanism-based classification system described by O'Sullivan (2005). This classification is based on findings derived from a standardized examination that includes a history and physical examination (Van Dillen et al. 2003). During the examination, the clinician attempts to identify spinal motions or alignments that provoke symptoms (i.e., to reproduce the patient's symptoms of pain or paresthesia; Maluf et al. 2000, Van Dillen et al. 2003). Once the subgroup has been identified, then treatment strategies can be implemented that restrict the symptom-provoking spinal motions or alignment during everyday activity (Van Dillen et al. 2003).

O'Sullivan (2005) proposed that these patients present with either movement impairments (characterized by pain-avoidance behavior) or control impairments (characterized by pain-provocation behavior). Studies which represent a comprehensive investigation into the validity of O'Sullivan's (2005) proposed mechanism-based classification system for a sub-group of localized mechanically provoked nonspecific LBP, favor its use in chronic phase, but further studies are needed in the acute phase of LBP (Dankarts & O'Sullivan 2011). For subjects with subacute LBP, specific movement control exercise combined with manual therapy has shown to be effective compared to general exercise within a subacute LBP group (Lehtola et al. 2016).

4. Treatment-based classification (TBC) system described by Delitto et al. (1995). The system describes subgroup classification of patients with LBP into manipulation, stabilization, specific exercise, and traction. The underlying premise of TBC is that subgroups of patients with acute LBP can be identified

from key history and clinical examination findings. Furthermore, the creators of TBC hypothesized that each subgroup would respond favorably to a specific intervention, but only when the intervention applied matched the subgroup's clinical presentation (George & Delitto 2005). In their study, George and Delitto (2005) provided evidence supporting the discriminant validity of TBC with acute LBP patients. According to the study by Ganesh et al. (2019), it is concluded that classifying and treating patients with LBP into subgroups based on signs and symptoms produce better outcomes. Level of baseline pain alone may predict a small percentage of people who may develop chronic pain (Ganesh et al. 2019).

5. The tissue-structural classification by Petersen et al. (2017) and Paatelma et al. (2009a). The largest percentage of physiotherapists utilizes a general tissue-structural (patho-anatomical/patho-physiological) classification system for LBP (Petersen et al. 2003; Spoto & Collins 2008). The aim of this classification is to provide matched interventions for patients with acute and subacute LBP through key history and clinical findings.

6. Accordingly, a thorough psychosocial screening with all nonspecific LBP clients has been recommended to be included in the examination and clinical reasoning regardless of the mechanical nature or the duration of pain (Linton et al. 2005). For example, classification of LBP with StartBack or Örebro questionnaires have been adopted (Katzan et al. 2019; Nicholas et al. 2019). Classification of psychosocial risk factors of pain becoming chronic have been labelled as low, medium and high risk (Mehling et al. 2015).

A systematic review of diagnostic accuracy studies that evaluate clinical examination findings for their ability to identify the most common tissue-structural based disorders in the lumbar spine has shown that some but not all diagnostic categories have sufficient evidence to recommend this classification. Most findings were tested in secondary or tertiary care. Thus, the accuracy of the findings in a primary care setting has yet to be confirmed (Petersen et al. 2017).

Despite the many classifications, NSLBP often goes undiagnosed in its early phase partly because it is considered to improve by itself, and partly because existing, reliable methods for its classification and examination require expert understanding in order to be utilized efficiently, and because of variation in the diagnosis between different health care systems (Suzuki et al. 2016).

2.3 Clinical tests in classification of nonspecific LBP

Different clinical tests and test batteries (test clusters) have been developed for NSLBP subclassification (Laslett et al. 2005; Petersen et al. 2003; Paatelma et al. 2009a). The type of clinical examination items for the assessment of clients with back pain include inspection, functional and mobility tests, provocation and alleviation of symptoms, muscle tightness, stability, and neurological and neurodynamic tests. In analyzing these seven test categories, the mean intertester kappa was 0.5 (95% CI, 0.05 to 1.20) and intratester kappa 0.6 (95% CI, 0.40 to 1.28). Overall inter- and intratester reliability was at an acceptable level, except

for the inspection test category, where agreement was poor (Paatelma et al. 2009a; 2010; Paatelma 2011). The overall inter-examiner reliability (kappa coefficient) for the subgroup classification between the six PTs and two experts was 0.63 (Paatelma et al. 2009a).

The kappa values for inter-tester reliability of movement control tests in the lumbar spine ranged from 0.24 to 0.71. Six tests out of ten showed a substantial reliability [kappa > 0.6]. Intratester reliability was between 0.51 and 0.96, and all tests but one showed substantial reliability (kappa > 0.6) (Luomajoki et al. 2007). For the interexaminer reliability of the McKenzie lumbar spine assessment in performing clinical tests and classifying patients with low back pain into subgroups, the kappa was 0.6 (Kilpikoski et al. 2002).

The pain mechanisms and symptoms reported in a client's pain history guide clinical reasoning and the selection of classification and clinical tests (Jones & Rivett 2004). According to Petersen et al. 2003, back pain in the early phase can be localized in various tissues/structures through provocation and alleviation tests. The strain or overloading of the different tissues and structures of the back (intervertebral discs, ligaments, nerves, joints and muscles) can be felt in the same area of the lower back or radiate into the lower extremities. With specific pain loading/provocation or with pain relieving tests, it may be possible to determine which tissue/structure the nociceptive stimulus is primarily coming from (Petersen et al. 2003; Laslett et al. 2005; Spoto & Collins 2008). Although positive and negative findings of clinical tests do not explain why these tissues/structures are overloaded or strained, they are important when explaining the pain mechanism to clients and when pain treatment for the early phase is designed. For clinical tests there is further need for investigations with better overall study methodology and the use of identical protocols for the description of clinical tests. The assessment of reliability is only a first step in the recommendation process for the use of clinical tests. In future research, the identified clinical tests should be further investigated for validity as well. Only when these clinometric properties of a clinical test have been thoroughly investigated can a final conclusion regarding the clinical and scientific use of the identified tests be made (Denteneer et al. 2018).

For this thesis, the tissue-structural classification (Paatelma et al. 2009a) and motor control classification (Luomajoki et al. 2007) of NSLBP in its early phase were selected for use in an additional education program conducted before this study.

3 PHYSIOTHERAPISTS` CLINICAL REASONING AND CRITICAL REFLECTION COMPETENCES

3.1 Clinical reasoning

Clinical reasoning (CR) and examination competences have been described to be part of the physiotherapist's core competences by the Finnish Association of Physiotherapists (2016) (Figure 1). CR is seen as an important competence through all stages of the physiotherapy process (Figure 2). According to Jones (1992), CR refers to the cognitive process or thinking used in the evaluation and management of a client (Jones 1992). Higgs and Jones (2008) also give the same type of definition for clinical reasoning, along with defining CR as a thinking process which occurs in a unique frame of reference within a person's professional and individual context as well as in the practice patterns of each workplace.

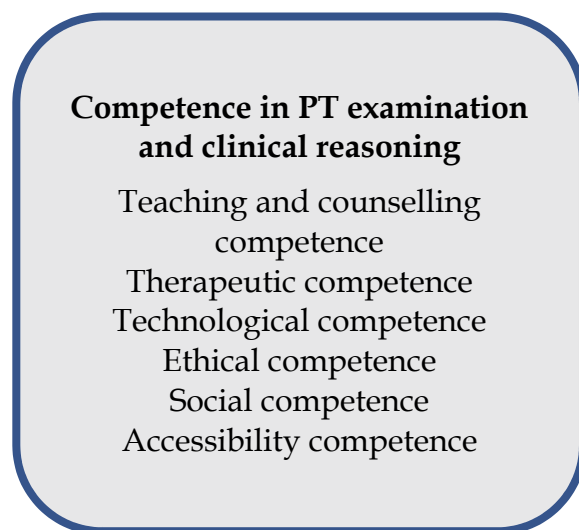


FIGURE 1 Core competences of a physiotherapist (Finnish Association of Physiotherapist 2016, English translation 2018).

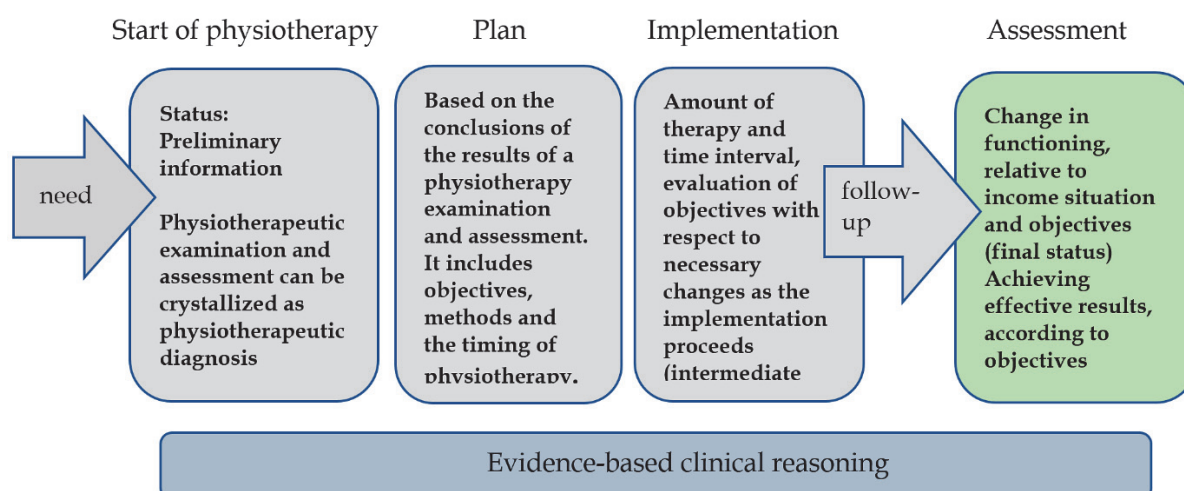


FIGURE 2 Stages of the physiotherapy process (Finnish Association of Physiotherapists 2016).

Jones and Rivett (2004) observe CR in more detailed in the context of client examination. According to them, CR consists of a decision regarding the reasons for the client's pain and disability and the choices of different examination approaches. During the examination, a physiotherapist makes assumptions on the subjective and objective test results obtained, either strengthening or weakening the earlier hypothesis he made according to the client's pain history. The CR process is guided by a physiotherapist's knowledge and skills in interaction with a client (Jones & Rivet 2004). This CR model starting from the initial assumptions made with a client's pain history and symptoms and verified during examination is called hypothetico-deductive reasoning (Jones & Rivet 2004).

The other type of CR is called a systematic model where some examination model is used in a pragmatic way and decisions are not made until the end of the examination. This model is applied by novices especially (Jones 1992). Edwards et al. (2004) describes a CR model which is based mostly on a client's stories and the content of the therapist-client dialogues, which is called the narrative clinical reasoning model. Pincus et al (2013) speak about the clinical inference model, used when dealing with, for example, chronic pain. According to this model, the psychosocial frame of reference takes precedence. However, the influence of the whole biopsychosocial approach is always constant in the client's examination. Whether the focus is on the biological, psychological, or social aspect depends on the primary factors behind the client's pain and dysfunction. (Pincus et al. 2013).

Learning CR and examination competences occurs in formal professional education in universities and in practical work after graduation. Furthermore, these competences can be developed in different types of continuing educational programs along with critical reflection skills to evaluate the development of each one in the learning process (Finnish Association of Physiotherapists 2018). A

physiotherapist's clinical knowledge develops through work experience and continuous learning. In this case, the action of the therapist is no longer routine, but is increasingly based on professional and independent decision-making as well as on the choices in each situation (Edwards et al. 2004). So, physiotherapists can use different decision models for making conclusions, even with the same client.

3.2 Critical reflection in clinical reasoning

Reflective thinking and reflective practice have been mentioned as crucial skills for professional disciplines (Mostrom & Shepard 1999; Richardson 1999; Clouder 2000; Holmström & Rosenqvist 2004) and as a hallmark of professional behavior (Shepard & Jensen 1992).

In the physiotherapy profession, reflective practice has been defined as an important and necessary skill for continual professional development and as the most important element in developing expert practice in a more evidence-based direction (Martin et al. 1995, Laitinen-Väänänen 2008).

Reflection as a concept has been defined in a range of ways. Reflection has been seen as a skill to combine theory and practice (Schön 1987). Reflective skills have been defined as part of self-regulatory knowledge, which, together with formal and practical knowledge formulates the knowledge required from an expert (Eteläpelto & Light 1999). According to Kolb (1984, 21-25), prior knowledge and skills are applied to the present situation during reflection, and past experiences are reconstructed while new meanings are given to them and extended to other situations and circumstances (Kolb 1984, 140-144). Furthermore, Mezirow (1990) and Brookfield (1990, 58-63) see reflective action as a critical assessment of one's own assumptions, and as an integral part of the decision-making process. A person is critically reflective when challenging their own or someone else's established practice, and furthermore, critically reflecting has been an important part of transformative learning (Mezirow 1990, Grabove 1997, Dirkx 1997). Transformative learning thereby develops autonomous thinking (Mezirow 1997).

In terms of improving and analyzing reflective skills, an understanding of various levels of reflectivity is necessary. Van Manen (1997) developed a three-level reflectivity taxonomy that helps to bridge theoretical concerns and observations from practice. Van Manen's taxonomy divides reflectivity into practical/technical, interpretative and critical levels. At the practical level, reflection focuses on practical application whereas, at the interpretative level, the focus shifts to analyzing the phenomenon. At the level of critical reflectivity, the interest shifts to ethical and societal considerations and the question that can be asked at that level could be "What ought to be?"

King and Kitchener's conceptual framework for analyzing reflective judgment thinking includes seven levels (King & Kitchener 1994 (44-74), 2004). The first three levels are called pre-reflective, and in these levels, knowledge is understood to be absolutely correct and gained through the word of an authority.

It is only from the fourth level that the presence of ambiguity in knowledge is accepted. When a person reaches level five in one's reflectivity, knowledge is understood to be subjective and contextual in nature, and thus different possibilities are found as a basis of interpretation. Even though at levels four and five one can use evidence in analyzing knowledge, the role of evidence in constructing a conclusion is not understood. Levels six and seven are the actual reflective levels. At level six, knowledge is understood to be a construction of evaluations based on evidence. Level seven's reflectivity is similar, but the process of re-evaluation is added to methods of inquiry and new perspectives on evaluation (King & Kitchener 2004).

During a CR process the physiotherapist either consciously or subconsciously makes decisions and choices. Conclusions based on the client's pain history with LBP, for example, guide the physiotherapist in choosing examination practices and clinical tests. Physiotherapists' skills when considering the factors which are relevant to patients' pain affects their conclusions and the selection of the best evidence-based therapeutic practice. Recognizing the factors and reasons behind one's own thinking and choices helps to review one's own decision-making and, in that way, also guides continued professional growth (Mezirow & Taylor 2009, 99-144; Illeris 2014, 5-91).

To deepen clinical examination, clinical reasoning and critical reflection competences have been focused on in the recommendation for PT education in direct access practice for MSD clients. Atkinson and Nixon-Cave (2011), stated that professional development is a cornerstone of physiotherapy practice. They also propose that for clinical reasoning and reflection the existing conceptual frameworks of the ICF should be incorporated.

In PTs' direct access practice, the demand for independent, critical decision making is challenging. It takes professional growth and experience after graduation to be able critically evaluate one's competences and need for continuing learning (Kurunsaari et al. 2015). Langridge et al. (2015) studied the clinical reasoning process of first-contact physiotherapists assessing clients with LBP. They observed that first-contact PTs reported experiencing greater stress due to higher levels of perceived accountability, safety requirements and internal drives for competence than non-first-contact PTs experienced. This should be taken into account when starting the new practice within an education program and when implementing the direct access in practice.

4 DIRECT ACCESS IN PHYSIOTHERAPY

Direct access to physiotherapy is a practice where musculoskeletal clients can utilize physiotherapy services without a referral from a physician (Webster et al. 2008; Bury & Stokes 2013a, 2013b). In direct access practice, the emphasis is on the freedom of choice for therapy location, fast access to service, faster recovery and lower health care costs (Kukka 2010; Swinkel et al. 2014; Lautamaki et al. 2016; Piano et al. 2017,). The autonomy of the physiotherapy profession enables clients to access physiotherapy services directly (Act on Health Care Professionals 559/1994). However, the practice in health care centers has traditionally required a referral from a physician. It is the physician, therefore, who often decides if a client requires a visit to a physiotherapist. This practice may lead to long waiting times for appointments with a physician and, once there, clients are often given only a prescription for medication and sick leave (Ylinen & Nikander 2014). In the majority of cases, clients are referred to further examination or physiotherapy only after prolonged pain or once pain becomes chronic (Weiser & Rossignol 2006). Clients have been able to access physiotherapy directly through private health care, but without a referral they do not qualify for reimbursement of the benefits. The practice of direct access is consistent with the impending renewal of the social and health care system in Finland, where the goal is for clients to be in the right place at the right time (Kangas 2017).

Direct access to physiotherapy enables clients to receive the correct clinical evaluation and treatment as well as guidance in pain relief and prevention for their musculoskeletal disorder (MSD) at an early phase (in less than 12 weeks). This should also reduce the workload in special health care as well as unnecessary imaging and surgery (Pohjolainen et al. 2017). Sick leave days may also be reduced through direct access practice (Börnhoft et al. 2019). In addition, in Finland direct access follows the national treatment recommendations for musculoskeletal disorders (Pohjolainen et al. 2017).

Direct access has produced some encouraging results in cost benefit and client satisfaction (Webster et al. 2008). In their systematic review, Ojha et al. (2014) concluded that the cost benefit for health care was likely due to the smaller amount of imaging and medication prescribed by physiotherapists than by physicians.

Related results have also been found in Scotland and the United Kingdom (Holdsworth et al. 2006; Holdsworth & Webster 2007; Holdsworth et al. 2007; Boissonault & Lovely 2017). According to Boissonault and Lovely (2017), respondents representing direct access organizations reported more timely access to physiotherapy services, enhanced client satisfaction, decreased organizational health care costs, and improved efficiency of resource utilization as the benefits of implementing a direct access model. From the cost-benefit perspective, fewer sick leaves and faster return to work have been found in several studies (Addley et al. 2010; Ojha et al. 2014; Börnhoft et al. 2019). In the systematic review, Arnold et al. (2019) concluded that early physiotherapy for acute LBP (within 30 days) may reduce health services utilization, cost, and opioid use, and improve health care efficiency, compared to delayed physiotherapy or usual care.

From the client perspective, good results have also been reported for client satisfaction due to quick referral to a PT and fewer visits needed because of the health issue (Holdsworth et al. 2006; Holdsworth & Webster 2007; Keles & Findikli 2016; Moffatt et al. 2018,). Regarding clients' safety in direct access, Mintken et al. (2014) reported that over a 10-year period, 12,976 patients accessed physiotherapy without referral, there were no reported cases of serious medical pathology or adverse events. Some studies have examined direct access from the perspective of health care professionals, the results of these showing an increase in work satisfaction (Kylänen et al. 2015). The findings in a systematic review, based on thirteen studies, which met the inclusion criteria, suggest that direct access to physiotherapy is feasible considering the clinical and economic point of view (Piscitelli et al. 2018). However, more research is still needed due to the low evidence of the reviewed studies.

The postgraduate education program for PTs in direct access practice has been conducted in Finland since 2000. The aims of direct access and the education program have been established according to clinical guidelines for early intervention to prevent the recurrence of pain and its becoming chronic (Pohjolainen et al. 2017), as well as after 2017 according to the recommendations for direct access education to PTs (Finnish Association of Physiotherapy 2017). The content of the education program was first focused on clients with low back pain (LBP) and dysfunctions, and later also on clients with all other musculoskeletal disorders (MSD). The aims and the content of the education program were established to supplement PTs' qualifications after professional certification. Two years of practical experience with MSD clients has been required for participation. The length of the education for MSD (minimum 15 credits) and the qualification of teachers has been defined in the guidelines.

Before starting direct access in health care clinics, it has been recommended that other health care professionals be informed about the new procedures and trained in them. A crucial aspect is instructions for the triage nurse in assessing the need for care and recognizing flags to determine which of the clients would potentially need an appointment with a physician (Weisser & Rosignol 2006). In addition, PTs are trained to carry out this screening and evaluate the need for consultation with a physician.

5 LITERATURE SUMMARY

LBP is the most common reason after mental health abuse for disability and for costs because of sickness allowance and invalidity pensions (Global health metrics 2017). According to the Health 2011 study, the incidence of LBP in Finns has continued to increase among both men and women (Finnish Institute of Health and Welfare 2011). Reason for LBP as a fluctuating trajectory over lifetime still remains open. Physiotherapists' direct access practice for LBP clients has been conducted to accelerate appointment time to treatment, to decrease the recurrence or the chronicity of pain and to better division of the work between health care professionals (Ojha et al. 2014; Kangas 2017; Bornhöft et al. 2019). Even if there are already several studies to show the advantages of this practice there are no studies to show what kind of content of physiotherapy should be or what kind of continuing education program after PT's graduation is suitable or adequate for this practice with LBP clients.

Several classifications of nonspecific LBP have been developed in order to provide more appropriate treatment for LBP clients (Fairbank et al. 2011), but there is currently not enough knowledge about which of these classifications could be most useful for the assessment of LBP clients in the early phase of pain. It has been presented that the important way for choice would be the use of pain mechanism as a criterion for the choice of classification (Kalso 2002; Baron et al. 2016). Tissue-structural classification of LBP based on nociceptive pain mechanisms has been used for the assessment of LBP clients in the early phase of pain (Paatelma et al. 2009a, 2009b; Petersen et al. 2017). Clinical tests and intra- and the intertester reliability of these has been investigated when using this classification (Laslett et al. 2005; Paatelma et al. 2009a, 2009b; Petersen et al. 2009). Nevertheless, knowledge is lacking on how accurately PTs translate this LBP classification into direct access practice in public health care organizations.

Clinical reasoning and critical reflection competences have been identified as among the core competences of PTs (Finnish Association of Physiotherapy 2017). Different models of clinical reasoning have been presented (Edwards et al. 2004; Jones & Rivett 2004; Pincus et al. 2013) but knowledge is lacking of how PTs use these competences and clinical reasoning models during the assessment

of LBP clients and how PTs justify and evaluate their choices, decisions and the achieved level of PTs' performance of these competences.

Even if former studies have showed the benefits of PTs' direct access practice, more information is still needed concerning this practice in Finnish health care organizations, adequate classifications of LBP and the implementation of direct access practice after a continuing education program, including regarding the experiences of LBP clients and PTs.

6 PURPOSE OF THE STUDY

The purpose of this study is to examine PTs' competences in the assessment of LBP clients and the implementation of direct access practice after a continuing education program.

More specifically the aims are to investigate the following:

1. How accurately do PTs apply their clinical reasoning in subclassification of LBP clients when using tissue-structural classification of LBP?
2. How do PTs justify their clinical reasoning and how critically do PTs reflect on their clinical reasoning in their assessment of LBP clients?
3. What are clients' experiences of the implementation of PTs' direct access practice?
4. What are PTs' experiences of the implementation of their direct access practice?

7 METHODS

7.1 Design

This thesis is based on four studies with different designs, where both quantitative and qualitative approaches were used as well as on the analysis of clinical reports written by PTs, questionnaires and interviews. In Study I, PTs' competence in clinical reasoning when classifying LBP clients into clinical subgroups were evaluated in a quantitative comparative research. The clients were seen in a direct access setting in public health care organizations. Study II examined PTs' clinical reasoning and critical reflection in assessment of clients through interviews.

For Study III, clients' experiences of implementation were studied in a retrospective, descriptive survey with a structured questionnaire. Finally, in Study IV, PTs' experiences of implementation were evaluated in a qualitative study with structured and open-ended questionnaire. The study designs and participants are presented in Table 1. (The designs are described in detail in the original articles.)

7.2 Participants

Participants for this study were recruited from public health care organizations in the southern part of Finland between 2012 and 2017. For Studies I and II, six voluntary physiotherapists were recruited. These PTs had participated one year earlier in a continuing education intensive course called "Physiotherapy for LBP in the early phase: physiotherapeutic examination and instruction". They were also the first to begin direct access practice at the health care center involved in the study. For Study III, the first 150 LBP clients who visited the direct access practice, were sequentially picked from the health care centers and a

questionnaire was sent to them. Eighty (53%) of those low back pain clients responded, who then comprised the participants of the study. For Study IV, four large municipal health care organizations in Finland were requested to participate. Two of these organizations indicated their willingness and possibilities to participate. One of these two organizations had also participated in Studies I-III. Thirty-four PTs from these health care organizations had previously participated in the direct access continuing education program. There were 18 physiotherapists from a public health care organization where direct access had started eight years ago, and 16 physiotherapists from another health care organization where direct access had been used for only a few months. (Table 1).

Good ethical principles were used in this study (Declaration of Helsinki 2001; Patton 2002, 85-94). Official permission for all separate studies was received from the administrations of the participating public health care organizations. The participation of clients and PTs was voluntary and handled anonymously.

TABLE 1 Study designs and participants.

Study	Design	N(female/male)	Participants, age; years, mean (SD)	Clinical reports
Competences				
I	Quantitative comparative research	6 (4/2)	PTs, 33.3 (8.5)	57 written reports by 6 PTs
II	Qualitative study (deductive content analysis)	6 (4/2)	PTs, 33.3 (8.5)	12 written reports by 6 PTs (used in interviews)
Implementations				
III	Retrospective descriptive survey	80 (47/33)	LBP clients, 51.0 (20.5) PTs, 41.2 (9.5)	
IV	Qualitative study (inductive content analysis)	34 (24/10)		

LBP=Low back pain, PTs=Physiotherapists

7.3 The continuing education program for direct access practice

For the present thesis a continuing education program was conducted between 2010 and 2017 in several health care organizations, some of these also participating studies of this thesis. The main aspects of this education program are described in Figure 3. The focus of the education program and PTs' direct access was on LBP clients in the early phase of pain (<12 weeks). The main

classifications of LBP clients were the tissue-structural and movement control classifications (Luomajoki et al. 2007; Paatelma et al. 2010). The tissue-structural classification was focused on clients' first visit. For clinical follow-up visits, the recommendation was to use movement control classification. The amount of appointment times to a PT was suggested to be, in line with recommendations, one to three times (Finnish Association of Physiotherapy 2017). Hypothetico-deductive reasoning was used for the choice of differentiation of subgroups and for conclusions about clients' assessment (Jones & Rivett 2004). The classifications and assessment tools are described in Figure 4. The subgroups of tissue-structural classification with clinical tests are described in Table 2. The ICF model of functioning was the framework for the content of the assessment and management of clients even if the focus in the early phase of pain was more on the tissue-structural and physical factors in the biopsychosocial approach to back pain (Figure 5).

The education program consisted of contact days and distance learning during the four months. Related literature and tasks supported the education and learning between contact days. Contact days consisted of theoretical and practical disciplines and subjects according to the aims of education (Figure 3). The main content in the education program of physiotherapy was good clinical assessment of LBP clients and guidance for self-management of pain and inhibition of pain recurrence.

The last two steps in this evaluation plan (see the bottom of Figure 3) were carried out after education in direct access practice: the evaluation of clinical reasoning and critical reflection in clinical reasoning about a client's examination; and the implementation of the direct access education program. The main aspects of the education program are shown in Figure 3.

Aims of the education program on direct access for PTs with LBP clients		
1. To develop clinical assessment skills including the recognition of red flags and psychosocial stress factors (indicating a need for consultation with a physician or other health care professionals)		
2. To develop knowledge of pain mechanisms and classifications of LBP		
3. To develop clinical reasoning and critical reflection skills when classifying LBP clients		
4. To develop interaction and guidance skills to support clients' self-management with their pain and dysfunction		
5. To develop skills to assess clients' needs for sick leave and medication		
6. To support early recovery of functioning and early return to work		
Main content and instructors of education program		
Duration	Content	Instructor
2 contact days	<ol style="list-style-type: none"> 1. Etiology of back pain 2. Recognition of red flags 3. Pain medication for acute and subacute LBP 	MD, specialist in rehabilitation
2 contact days and 1 day for final examination	<ol style="list-style-type: none"> 1. Pain mechanisms 2. Classifications of LBP 3. Clinical guidelines for LBP 4. Examination of LBP clients 5. Clinical reasoning with LBP clients 6. Subclassification and clinical tests (theory and praxis) 7. Pain management and therapeutic exercises 	PTs with OMT education
Advanced theoretical literature and tasks between contact days, during clinical practice; written client reports; peer and instructor reviews digitally		
Evaluation of learning and application of the education program in practice		
During the education program		
1. Evaluation of clinical reasoning in written case reports		self and instructor evaluation
2. Demonstrations of client's examination		self, peer and instructor evaluation
During the direct access practice after education		
1. Evaluation of clinical reasoning and critical reflection about client's examination		researchers
2. Implementation of the education program in direct access practice according to experiences of clients and PTs		researchers

FIGURE 3 Main aspects of the direct access education program.

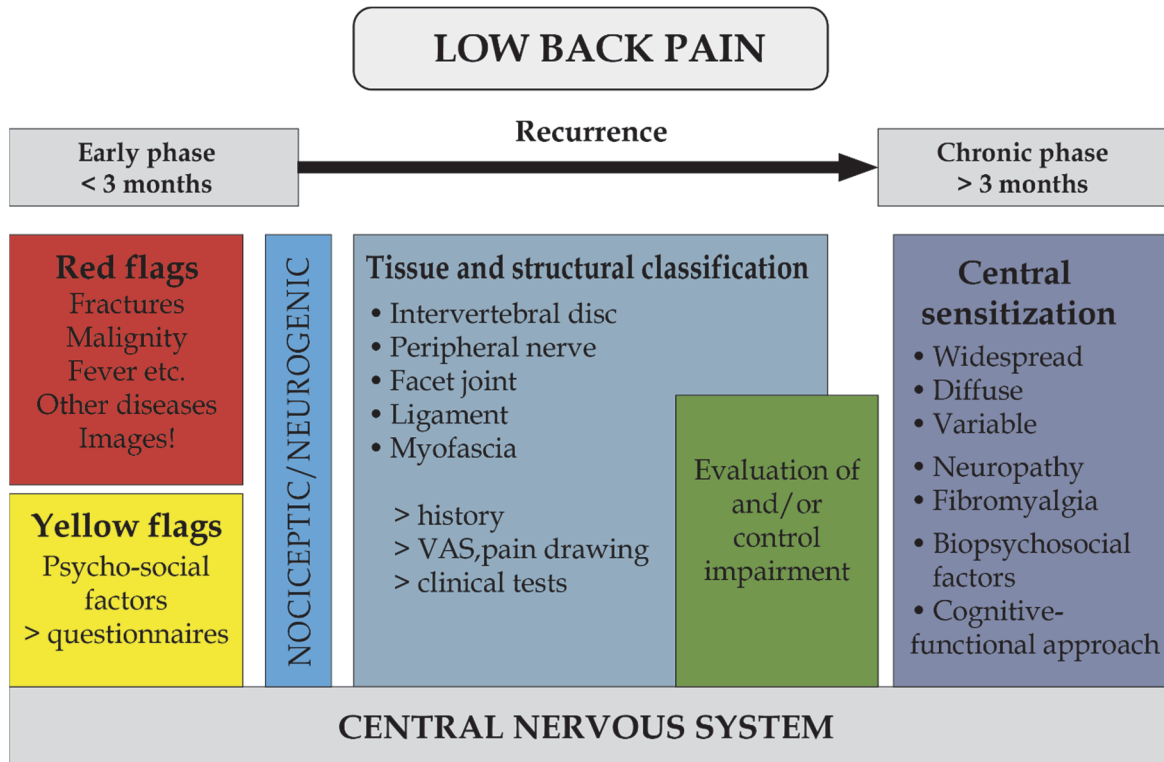


FIGURE 4 Content of education program regarding classification and assessment tools for LBP.

TABLE 2 Tissue-structural subclassification of LBP clients (adapted from Paatelma 2011).

LBP in early phase: Clinical subgroups					
Sub-group	Discogenic / radicular pain	Clinical / functional instability	Segmental dysfunction	Sacroiliac pain/ dysfunction	Clinical spinal stenosis
History, clinical findings	Pain radiating to lower limb	LBP / tiredness / sustained positions painful	LBP provoked by movements	Deep buttock pain, when loading lower extremity	LBP and lower limb pain, weakness / numbness
Clinical tests	SLR, Modified SLUMP, neurology and neurodynamic tests	TrA and multifidus activation, movement and control tests	Physiological end range movements, joint play tests	ASLR, PPPP, S-I joint provocation / alleviation tests	Extension tests, neurology and neurodynamic tests
Physio- therapy	Traction, neural tissue mobilization	Act / pass lumbar stabilization	Spinal mobilization / manipulation	Act / pass pelvic girdle stabilization	Traction in flexion, mobilization
Guides for self- manage- ment	Pain free positions, auto- traction, neural mobilization	Act core stabilization, functional exercises	Automobiliza- tion, myofascial stretching exercises	Pelvic belt if needed, stabilization exercises	Automobiliza- tion in flexion, back and lower limb strengthening exercises

ASLR = active straight leg raise-test

Modified SLUMP = intervertebral disc provocation test

PPPP = posterior pelvic pain provocation test

SLR = straight leg raise test

TrA = transversus abdominis activation test

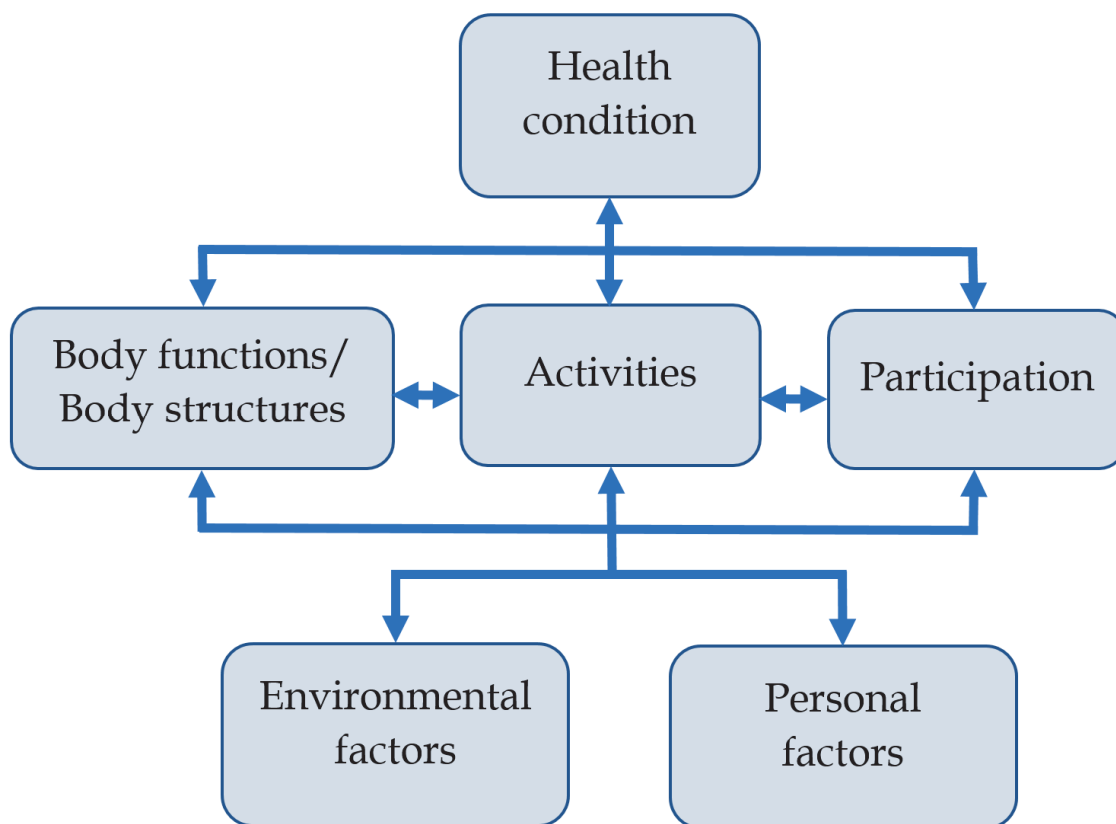


FIGURE 5 Bio-psycho-social model of the International Classification of Functioning, Disability and Health (ICF), (WHO 2001).

7.4 Data collection

In Study I, the data, which included the documentation (based on the analysis of clinical reports written by six PTs for the assessment of 57 clients) were collected at a single Finnish health care center by the chief physiotherapist. Each PT wrote from 5 to 12 clinical reports. These PTs had completed the continuing education program.

In Study II, the data were collected in interviews with the same six PTs as in Study I, where the stimulated recall method was carried out with the help of stimulus activities that follow the course of the actual situation (Powell 2005). The reinforcing stimuli were the written clinical reports of the PTs' clients (records). The interviews were audio-recorded and transcribed

Questionnaire 1 (see Appendix 1) with structured and open-ended questions (Study III) was sent to 150 low back pain clients between the ages of 15 and 82, who were gathered in order from the health centers, where the direct access of physiotherapists had already been established. The questionnaire

regarding the clients' experiences was sent three months after the client's visit to a physiotherapist.

Data of 34 PTs' experiences (Study IV) were collected with questionnaire 2 from the participating PTs. The questionnaire was forwarded to the PTs by the heads of physiotherapy clinics. The questionnaire consisted of 15 questions (see Appendix 2). The first 12 were structured questions about the background of the physiotherapists, demographic details and general information about the client groups and the administrative organization of direct access at the physiotherapists' workplaces. The last three open-ended questions focused on physiotherapists' experiences in the implementation of direct access practice in their work.

7.5 Statistical methods and data analysis

For data analysis both qualitative and quantitative methods were used. In Study I, the agreement of clinical subgrouping between six physiotherapists and two experienced PT reviewers as well as between the two reviewers was statistically analyzed. The level of agreement between the decisions of the reviewers and the six physiotherapists was calculated and expressed as a percentage of the physiotherapists' combined conclusions. Consistency was assessed by the statistical coefficient kappa (K) (95% confidence interval [CI]). The review also included decisions on the subgroup distribution. The K value can be interpreted as follows: <0.20 (poor), 0.21–0.40 (fair), 0.41–0.60 (moderate), 0.61–0.80 (good), 0.81–1.00 (very good).

For the analysis of the data in Study II, qualitative, deductive, theory-driven content analysis was applied (Schreier 2012, 85-87). In deductive content analysis, the existing data – in this study the interviews – were analyzed by applying the themes provided by two theories (hypothetic-deductive clinical reasoning and King and Kitchener's (2004) critical reflection models).

In Study III, participants were divided for data analysis into three groups for further possible observation according to their labor market status: retired people ($n = 26$); unemployed people ($n = 15$); and students and employed people ($n = 39$), which are essential groups in direct access practice. The sequential variables between the groups were tested by a one-way analysis of variance (one-way Anova), which was confirmed by a nonparametric test (Kruskal-Wallis). In the case of two groups, an independent samples t test and the corresponding nonparametric test (Mann-Whitney) were tested. The nominal variables were tested by a crosstab and chi-square independence tests. The correlation between the variables was analyzed with the Pearson correlation coefficient. Replies to open-ended questions were transcribed and combined according to similarities for statistical analysis.

In Study IV, PTs were divided into two groups: experienced ($n = 18$) and beginners ($n = 16$) for data analysis to study possible differences according to the length of their working experience. For structured questions, statistical analysis

of the material was carried out using SPSS statistical software. In the case of two groups, the corresponding nonparametric test (Mann-Whitney) was used. The grading scale variables were tested with cross-tabulation and a chi-square independence test and confirmed with Fischer's exact test. For all comparisons, a probability of <0.05 was considered statistically significant (2-tailed; Hicks 2000, 119-179; Sim & Wright 2000, 69-87). In Study IV, qualitative methods were applied in the analysis of the physiotherapists' experiences from open-ended questions. These data were analyzed by applying inductive interpretive content analysis, as defined by Graneheim and Lundman (2004).

TABLE 3 Summaries for the methods of data collection and data analysis.

Methods of data collection	Methods of data analysis	Study
Competences		
The written clinical documents of the PTs' examination of LBP clients	The level of agreement between the decisions of the reviewers and six PTs about subgroup classification was calculated using SPSS statistical software.	STUDY I
The stimulated recall interviewing method	In the analysis of the data, qualitative, deductive, theory-driven content analysis was applied	STUDY II
Implementations		
Questionnaire 1	The data of structured questions were analyzed using SPSS statistical software. The open answers were transcribed, and the similarities of the answers were combined.	STUDY III
Questionnaire 2	For the structured questions, statistical analysis was carried out using SPSS statistical software. The data from the open-ended questions were analyzed by applying inductive interpretive content analysis	STUDY IV

8 RESULTS

The results can be summarized and observed from two perspectives. The first is from that of PTs' competences (clinical reasoning competence in the assessment of LBP client with tissue-structural classification of LBP and critical reflection competence in clinical reasoning). The second is from the perspective of the implementation of direct access practice (clients' experiences and PTs' experiences).

8.1 The perspective of physiotherapist's competences

8.1.1 Clinical reasoning

When looking at the results, they indicate that PTs were able to apply the clinical reasoning competence with tissue-structural classification and to make consistently accurate diagnostic decisions about subgroups for clients with LBP in its early phase (Study I). The level of agreement between the decisions of the two reviewers and PTs showed 74% overall agreement ($\kappa = 0.63$, 95%CI: 0.47-0.77) of all client subgroups (discogenic pain, clinical instability / segmental movement control impairment, clinical / functional stenosis, segmental dysfunction / facet pain and sacroiliac joint pain / dysfunction; see Table 4. Discrepancies between the PTs' and reviewers' classification and the decisions of subgroups were noted to arise from the missing description or use of some specific clinical tests for differentiating subgroups, such as disc load test while sitting (the modified SLUMP test), in discogenic pain or extension test in Clinical spinal stenosis (Study I). See Table 2. In classification categories; Other classification or Not classified were recorded if a report was not sufficient for decision making or the reason for back pain was not fitting in this classification as for instance chronic LBP or to other care problems related.

TABLE 4 Inter examiner agreement of the classification of 57 clients with low back pain between PTs and reviewers.

LBP classification	6 PTs	2 Reviewers	Agreement%	Kappa (95 % CI)
Discogenic pain	3	5	60	
Clinical instability / segmental movement control impairment	13	10	77	
Clinical / functional lumbar spinal stenosis	0	1	0	
Segmental dysfunction / facet pain	23	23	100	
Sacroiliac joint pain/dysfunction	10	11	91	
Other classification	6	3	33	
Not classified	2	4	25	
Overall agreement Kappa			74	0.63 (0.47 to 0.77)

8.1.2 Critical reflection in clinical reasoning

When observing the flow of clinical reasoning and critical reflection (Study II), PTs started their reasoning from clients' pain history and symptoms and made their initial hypothesis about the possible source of pain and for the selection of clinical tests towards the conclusion about the subgroup of classification (Figure 6). PTs also critically analyzed and reflected on their choices and decisions on clinical reasoning regarding client's symptoms, onset of pain, clinical test choices and test results using the hypothetic-deductive reasoning model in their conclusions. They considered the adequacy of tests for drawing conclusions and their own manual skills as PTs as well as for the classification of LBP being used. Special attention was given to clients with recurrence of pain or with psychosocial stress factors. In the critical reflection levels, based on King and Kitchener (2004), PTs' judgements were at levels four to seven, indicating that PTs were able to critically justify their performance and give other solutions to the problem in question (Figure 7). (Study II)

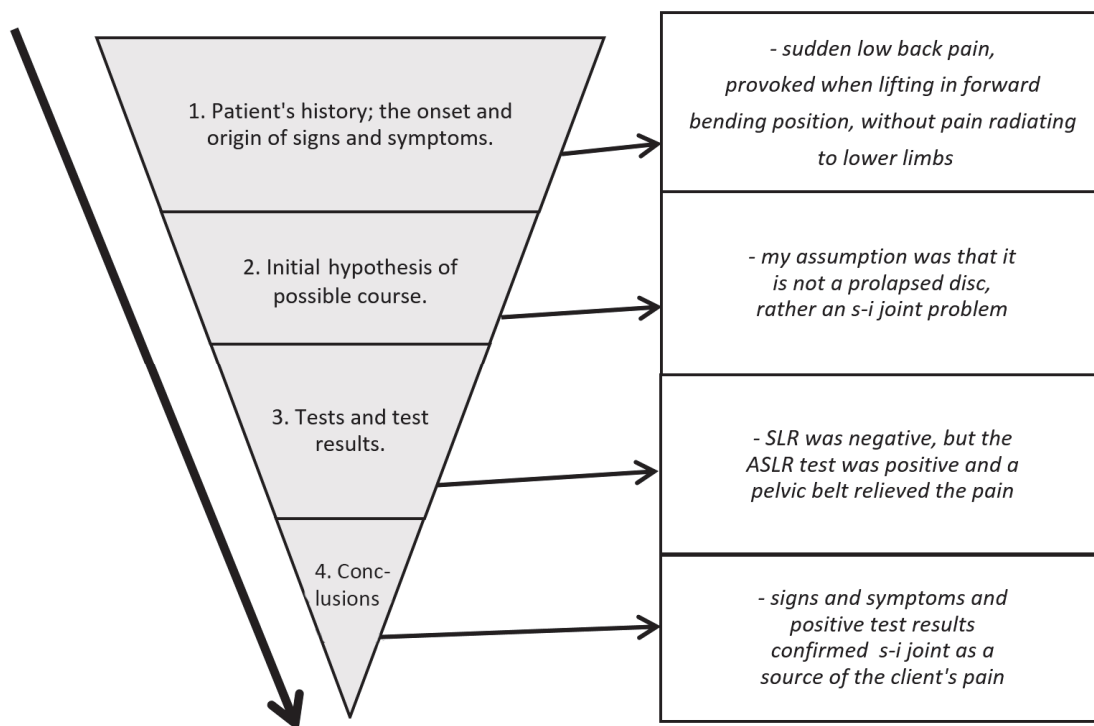


FIGURE 6 Example of the results of PTs' clinical reasoning with hypothetico-deductive reasoning model.

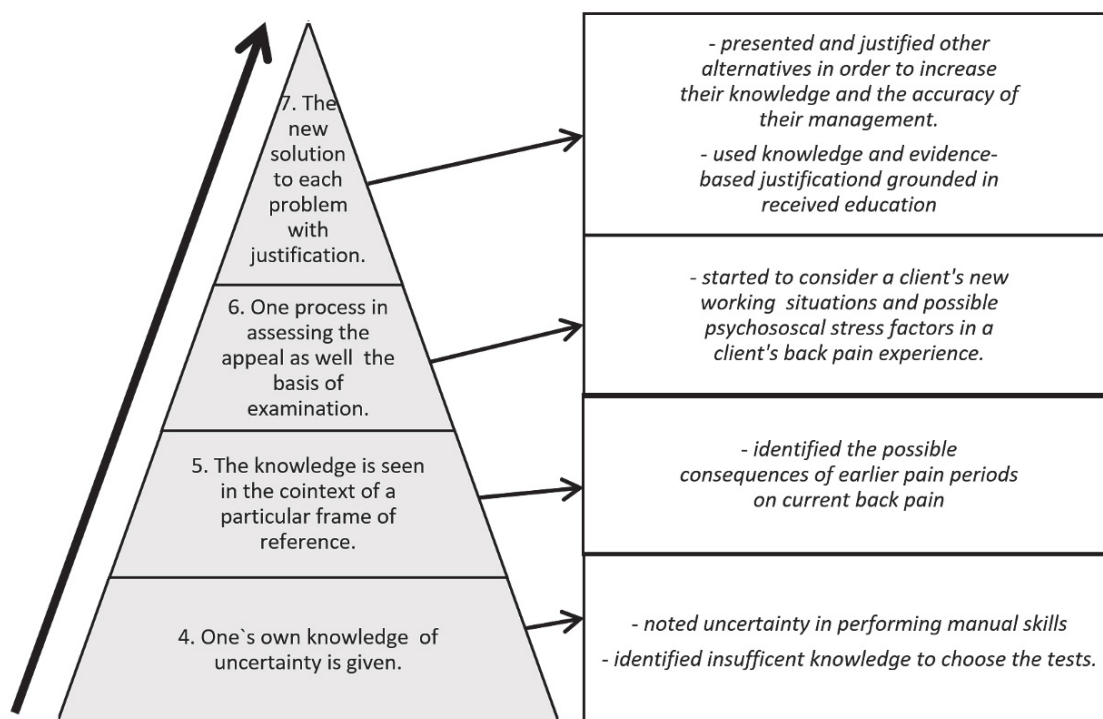


FIGURE 7 Examples of the results of PTs' critical reflection in clinical reasoning, based on the reflection levels by King and Kitchener (2004).

8.2 The perspective of implementation of direct access practice

8.2.1 Clients' experiences

More than three quarters (80%) of clients in all three subgroups (retired, unemployed and employed, and student group) were told to get help for their back pain a lot or moderately (Study III). Clients viewed the early visit to a physiotherapist as useful in the treatment of back pain and in the prevention of new pain episodes. The recurrence of pain over three months was the lowest (15 %) in the employed and student group and highest (30 %) in the retired group. The need for repeat visits to a PT or to a physician for the same back problem was low (14%–15 %). The fear of pain had mainly decreased in all groups, less in the unemployed group. Clients in all groups reported having performed the exercises instructed by the PT well or moderately. However, approximately half of those who felt not having help for their back pain, reported not having performed the exercises instructed. A notable observation was that only one person was on sick leave during the previous three months (Figure 8).

The results also showed some differences between different client groups even if benefits from direct access visits seemed to occur in all groups: 1. The retired group mentioned, compared to other groups, the need for more visits than was included, to ensure self-management and to obtain the advice of PT. 2. In the unemployed group, the reasons for the fear of pain and the recurrence of pain predict the selection of possible psychosocial stress in connection with these issues (see Figure 8. Results of clients' experiences of direct access practice).

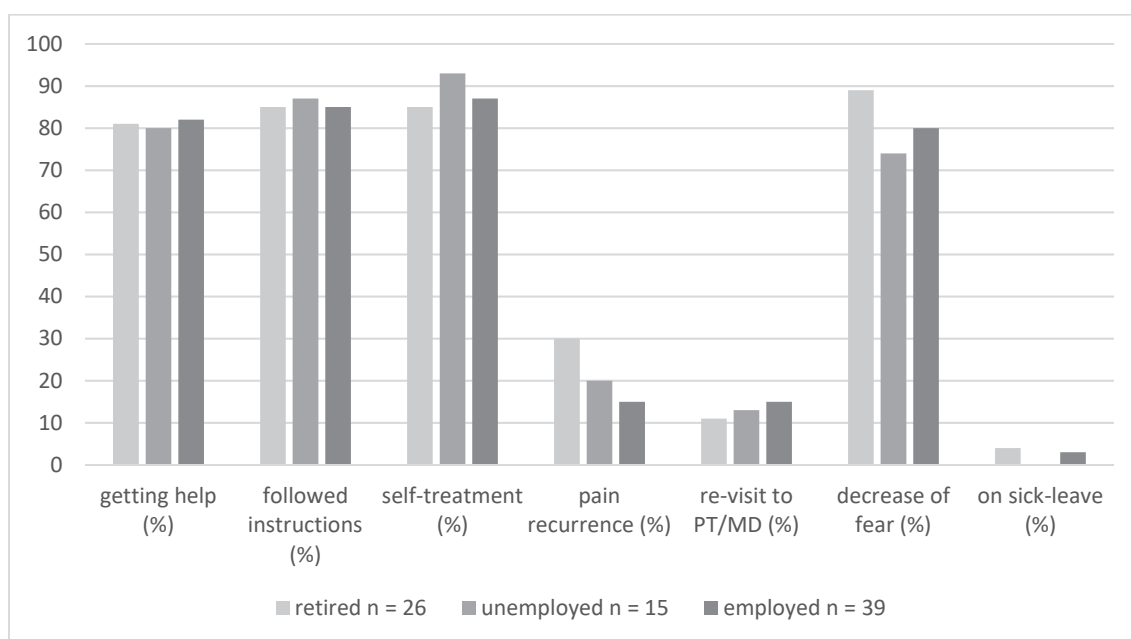


FIGURE 8 Results of LBP clients' experiences of direct access with PTs.

8.2.2 Physiotherapists' experiences

PTs described their experiences of direct access practice from three perspectives: clients' perspective, the work perspective and working communities' perspective.

In clients' perspective PTs highlighted clients' satisfaction with direct access by fast access to care, with guidance of their back pain, and quick return back to work. In work perspective, PTs expressed the growth of professional pride, self-confidence and appreciation. They experienced their work now more systematic. In work communities' perspective, PTs commented the importance of functional co-operation with reception, with physicians and other health care professionals. In connection with these three perspectives, PTs felt the increase of the meaningfulness of their work (Figure 9).

PTs indicated numerous aspects also to be essential: the possibility to regularly update their knowledge and information, training new staff members as well as having a sufficient amount of PTs to implement the new practice (Figure 9).

The differences between beginners and experienced PTs in direct access practice showed the need for a longer appointment time (>60 min) for clients when the new practice was started to diminish the stress related to the adequacy of their competence. The summarized results regarding PTs' experiences of their direct access practice has been described in Figure 9.

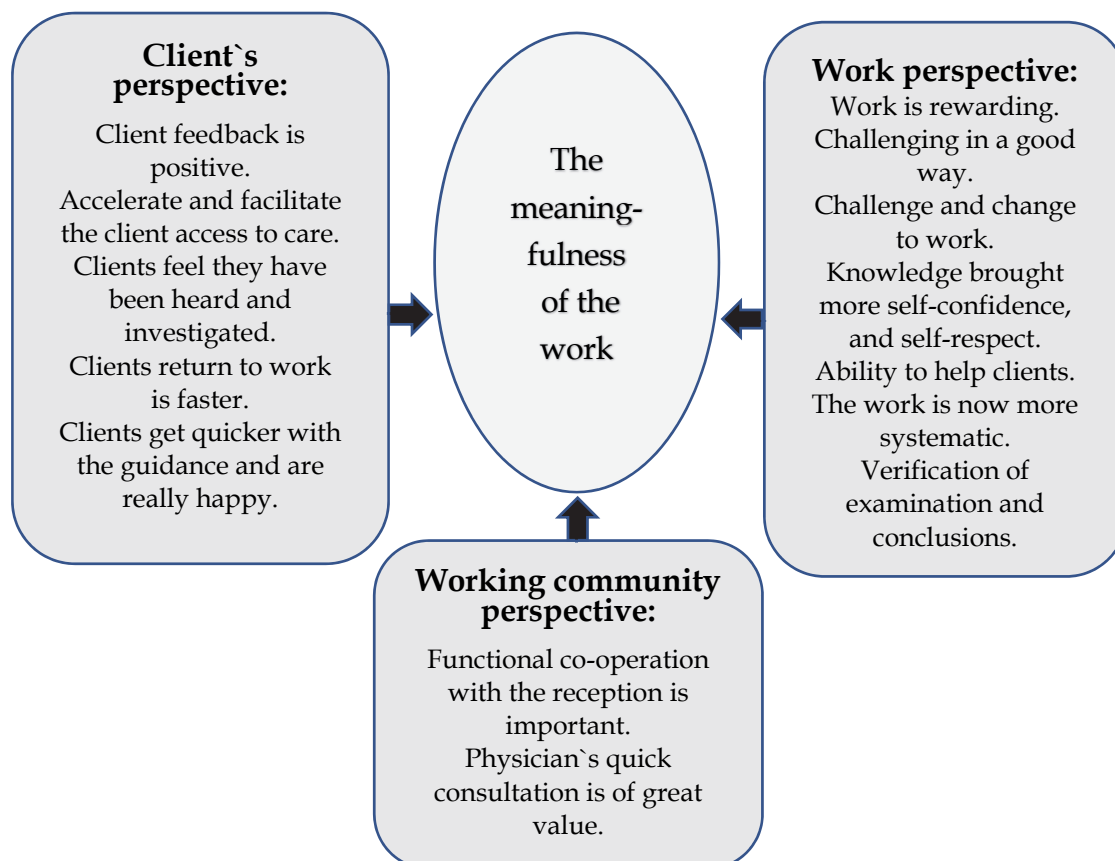


FIGURE 9 Summarized results about physiotherapists' experiences of their direct access practice.

9 DISCUSSION

9.1 Physiotherapists' competences

9.1.1 Clinical reasoning

When observing PTs' clinical reasoning competence, the results showed that PTs were able to use tissue-structural classification of LBP and hypothetico-deductive reasoning in the examination of their clients when observing PTs' subgroup conclusions with this classification. Hypothetico-deductive reasoning has been used when a nociceptive pain mechanism is related to the symptoms (Jones & Rivett 2004). The initial hypothesis of the reasons for the pain and for the choices for further assessment of the client is driven by the client's pain history (onset of pain, pain location, symptoms, pain duration, pain mechanism). As in our study, when the tissue-structural classification of pain has been applied, the final conclusions about the examination of a client will include decisions about possible tissues or structures involved with the pain and dysfunction. The same LBP classification has been used in studies by Paatelma et al. (2009a, 2011) and Petersen et al. (2017), supporting the use of this classification. When comparing the accuracy of the subclassification to other classifications, the results are comparable. In Paatelma et al. (2009a), the overall interexaminer reliability (kappa coefficient) for the subgroup classification between examiners was 0.63, as it was in our study. To make accurate conclusions during a client's assessment, clinical reasoning competence as well as skills to perform a sufficient amount of clinical tests for differentiation of subgroups are needed (Lasslett et al. 2005; Paatelma et al. 2009a). In our study, more clinical tests could have been used to differentiate segmental instability, sacroiliac joint pain and facet pain if symptoms and the client's pain history would have indicated it (Study I).

During the preliminary education program of the current research, PTs had been taught and recommended to use tissue-structural classification in a client's first visit and classification of movement control in follow-up visits. The criterion

for this recommendation was the assumption and clinical experiences about the lack of reliable testing, or its weakness, for a client's movement control in the painful phase. In their review, Nijs et al. (2015) noted the need for LBP classification according to nociceptive pain mechanism and movement dysfunction, but they also pointed out that all pain implies activation of the brain, including activity in regions responsible for cognitive-emotional and affective progressing input. Accordingly, a thorough psychosocial screening with all nonspecific LBP clients has been recommended to be included in the examination and clinical reasoning regardless of the mechanical nature or the duration of pain (Linton et al. 2005). For example, classification of LBP with StartBack or Örebro questionnaires have been adopted (Katzan et al. 2019, Nicholas et al. 2019). Even if psychosocial risk factors of pain becoming chronic and subgrouping with these questionnaires have been labelled (low, medium, high risk for chronicity of pain), it leaves the question of how to decide what else the clients in these subgroups need. Anyhow, as in our study, PTs also raised questions regarding the need to screen for psychosocial stress factors or the difficulties in subgrouping clients with only one classification.

Baron et al. (2016) state, that classification of LBP based on the pain mechanism might be more adequate than duration of pain. From the point of internal validity, it can be discussed which one of the LBP classifications would be the most valid for examining and managing the clients with LBP. Rabey et al. (2015) and Nijs et al. (2017) noted that clinicians should not become fanatic supporters of one classification system for LBP (including the one presented in this study), but incorporate the multiple dimensions of LBP including pain mechanisms in their clinical reasoning in order to better assess and treat clients with LBP in its different time duration and in clients' different life situations. Accordingly, a PT's clinical reasoning should start with the decision of which classifications of pain and dysfunction she/he will use with the client and which, from the client's point of view, serves as the criteria for one's choices. So, a PT should be able to know and use a range of pain classifications in the early phase of LBP, even if the focus in present study was mainly on a single LBP classification. The appropriate questionnaire for identifying patients with a poor long-term health-related and/or work ability outcome in a population with acute and subacute back pain may be a useful tool in primary care physiotherapy assessment and practice to increase the validity of clinical examination (Forsbrand et al. 2018).

9.1.2 Critical reflection in clinical reasoning

Critical reflection has been mentioned as another core competence in the physiotherapy profession (Finnish Association of Physiotherapist 2016). Self-evaluation of the basis of one's own practice, skill level and competence help one to make decisions on the need for further learning and for other possible solutions with clients. In this study, PTs' critical reflection was assessed using interviews about the clients' examination and the arguments the PTs gave for their decisions. The study results showed that PTs critically reflected on their

choices in the examination of their LBP clients and they also proposed new alternatives to improve their examination. For example, they discussed the inadequacy of the classification for clients with psychosocial stress factors. Widerström et al. (2019) examined aspects influencing reasoning and decision-making with LBP in primary care. The findings underpin the need for clinical self-reflection, initiatives for skilled clinical competence and the importance of clinical observations in the complex treatment selections process when implementing evidence-based recommendations in clinical practice (Widerström et al. 2019). In our study, the evaluation of PTs' skills for reflection focused on clinical reasoning and the decisions made during a client examination. The client's pain history and dysfunctions as well as their emotions and expectations should be the initial knowledge by which the PT makes decisions about which information and skills to apply when continuing with the client. For example, one of the PTs in this study suggested that client's insecurity about new demands at work might be connected to client's experience of back pain.

Even if the focus in the present research was on critical reflection in hypothetico-deductive reasoning, it does not exclude a more multidimensional approach when focusing on the experiences and feelings of clients as discussed in Chowdhury & Bjorbaekmo (2017). In our study, PTs observed that they disregarded clients' psychosocial factors in their assessment. This kind of critical thinking and assessing other possibilities for practice has been seen as the essential element in critical thinking (Mezirow 1997, Boyd & Myers 2006). According to Boyd and Myers (2006), an individual realizes that old patterns or ways of perceiving are no longer relevant enough and moves to adopt or establish new ways, and finally integrates old and new patterns. According to our study results, the use of three classifications of NSLBP (tissue-structural, movement control and in addition psycho-social risk factors) could be recommended in the early phase of LBP.

Competence in critical reflection should be targeted in education programs for PTs at all stages. Everyone should also have the opportunity to receive a range of feedback to support learning and professional development and promote their growth from novice to expert (Laitinen-Väänänen 2008, Kurunsaari et al. 2015). In our study, feedback and learning assessment plan was included in the education program, which was carried out before the implementation of direct access practice. Nevertheless, the critical reflection should continue in work.

9.2 Implementation of direct access practice

9.2.1 Clients' experiences

The implementation of direct access practice was studied with questionnaires that addressed the clients' as well as the PTs' point of view. The study results showed that the aims of direct access were, in clients' experiences, achieved. Clients were satisfied with a quick appointment for PT, the recurrence of pain

was low during the three months after the first visit to the PT and return to work was quick. New visits to the PT or a physician were necessary in only a few cases (Study III). These results support the results of earlier studies about benefits of direct access practice (Holdsworth et al. 2006; Holdsworth & Webster 2007; Holdsworth et al. 2007; Ojha et al. 2014; Keles & Findikli 2016; Boissonault & Lovely 2017; Piscitelli et al. 2018).

Bornhöft et al. (2019) evaluated the cost-effectiveness from a societal perspective of MSD clients (N = 55) to initial assessment by physiotherapists compared to the standard practice with an assessment by an initial physician (GP). The use of healthcare resources and absences from work were monitored for a one-year follow-up period. The results indicated that directly to physiotherapists in primary care has a high likelihood of being cost-effective. Accordingly results of our study, similar findings have been done because of low absence of work of employed LBP clients. The study results also showed that differences between different client groups (employed/students, retired, unemployed) should be taken into consideration in practice with more individualized management according to appointment visits (retired) and wider psycho-social screening approach (unemployed). According to Hill et al. (2011) study results, researchers suggest the use of prognostic screening with pathways (STarT Back) for management of back pain.

The fear of exercise and movement because of back pain has been presented as one of the reasons for the recurrence of pain and it's becoming chronic (Lundberg et al. 2004; Cook et al. 2006; Koho et al. 2011). According to study by Wertli et al. (2014) evidence suggest that fear avoidance beliefs are prognostic for poor outcome in subacute LBP, and thus early treatment, including interventions to reduce fear avoidance beliefs, may avoid delayed recovery and chronicity. In our study, the fear of pain decreased in most of the clients in all groups, but less in the unemployed group (Study III). Providing understandable explanations for clients' LBP and encouraging safe activities has been one of the important aims to decrease the fear of pain and movement (Pohjolainen et al. 2017). This is also one of the aims in PTs' direct access practice.

9.2.2 Physiotherapists' experiences

The implementation of direct access practice was evaluated from PTs' point of view as well. The results indicated that PTs were satisfied with their work and experienced their work as meaningful. This is a significant result when observing the employer's commitment to a new practice and the implementation of new knowledge and competences. Moffat et al. (2018) highlighted the extra effort needed when assessing implementation. Without guidance and support, it is easy for the new practice to be marginalized before it is deeply absorbed into practice (Moffatt et al. 2018). In our study, the guidance and support were planned and carried out for implementation already during the preliminary education program.

Another important result on the implementation of the new practice that was identified in the PTs' answers addressed the commitment to the practice and

good collaboration among the entire working community. This issue was also in line with the main results in Kangas (2017), which noted that without the commitment of PTs and physicians the desired culture or social division of labor cannot be achieved. A further notable result in our study was how the PTs experienced an enhanced feeling of professional pride and appreciation after their level of competence increased after the education program. This will probably further support PTs' commitment to the new practice. According to the study results, the satisfaction and meaningfulness PTs felt in their work were connected to the satisfaction of their clients being in the right place at the right time.

9.3 Strengths and limitations of the study

Even if there already are several studies from different countries that show the benefits of PTs' direct access practice with LBP clients there has been a lack of knowledge about influence of differences in health care cultures and different education programs as well as about PTs' competences in direct access (Bury & Stokes 2013,a). The strength of this research is that the context of it was Finnish primary health care for LBP clients and the PTs who had participated in a continuing education program for direct access practice, described in this paper.

The clients and PTs for this study were recruited from public health care organizations in the southern part of Finland, so it can be asked if LBP clients would differ in other parts of Finland, which could have had an effect on the results, both from client point of view and that of the PTs. The main aim for direct access in the early phase of LBP and dysfunction is to inhibit the recurrence of pain and it's becoming chronic. The results indicate that this aim was achieved three months after the clients' first visit, but there remains a need to obtain information from a longer follow-up period and with bigger client samples.

It is worth noting that in this study the influences between different LBP classifications were not compared with each other. Instead, the one that was used had been shown to work in an earlier study (Paatelma et al. 2009a). Nevertheless, it cannot be stated whether another LBP classification and education program would have achieved as good results or even better.

PTs' knowledge and level of competence were not formally evaluated before they started the education program, so it cannot be said that all of their learning or the deepening of their competence occurred during the program. However, how PTs implemented the content of the education program in direct access practice could be examined, along with their experiences of learning and of the new practice. Even if the results cannot be extended to concern all PTs working in direct access practice or all LBP clients, they provide important information about PTs' competences and the implementation of direct access.

The education program in this study was planned for PTs with clients in the early phase of LBP and is probably not adequate or sufficient for those in the chronic phase. Even if already in the early phase of LBP a multidimensional

approach is recommended according to pain mechanisms and other aspects of a client's situation, tissue-structural classification seem to be one available with others. All the above-mentioned facts have the effect on the generalization of the study results (internal and external validity).

Using both quantitative and qualitative research methods can be seen one of the strengths of this research. This issue has been discussed more detailed in the following paragraph.

9.4 Methodological considerations

The PT participants represented 36 PTS who had received continuing education before the implementation of direct access. Even if the sample size was small (6 PTs) in Study I and Study II, it was shown to be sufficient for data collection in study II from the perspective of saturation (Guest et al. 2016). Guest et al. (2016) discussed, based on a review of literature, which sample size would be sufficient in qualitative studies. They concluded that for interviews a sample size of six individuals would be sufficient. In our study, two additional interviews after the initial six failed to provide new information, thereby supporting the conclusions in Guest et al. (2016). The influence of differences between the personalities of PTs was discussed in Study II, and there were some differences between individuals of how critically or openly each was willing to criticize his or her performance. The amount of client reports (57) in Study I also provided enough data for analysis from the point of view of different client subgroups. In Study IV, only 34 PTs from southern Finland participated, which does not cover PTs' experiences throughout Finland. This is due to the different organizations and different type of clients in direct access and possible different continuing education program for PTs. Participants in Study III were those 80 LBP clients of the earlier 150 clients who had visited PTs' direct access practice in different clinics of one large public health care organization three months before the questionnaire. The response rate with this sample size was 53%, and it could have been higher. To increase the response rate of clients, the questionnaire was sent twice to all participants. The inquiry for willingness of participation was sent to four large municipal health care organizations but only two of those agreed to participate in Study IV.

The data in Study I were collected through PTs' client clinical reports. Without conclusions about the client's assessment, the evaluation of agreement between clinical reasoning and tissue-structural classification could not be possible. During the education program for PTs in this study, there was guidance and practice in using the so-called structural report writing model, which also includes a conclusion (physiotherapy diagnosis) about the client's assessment. In Study II data were collected with interviews using the stimulated recall method with client reports that were written three to five days before the interview. It is possible that everything about the clinical examination was not written down, which decreases recall of the assessment situation afterwards. In Study III and

IV, the data were collected with questionnaires and even if both questionnaires were pretested by one chief PT in a health care center and commented on, they were not developed with a systematic process and therefore some relevant information may have been omitted.

The data in this study were analyzed with quantitative and qualitative methods. Quantitative methods made it possible to obtain exact figures for study questions as in Study I and in Study III, and background information about participants in all four studies. On the other hand, the qualitative study methods enabled deeper observations about some study questions, as with clinical reasoning competence and critical reflection competence in Study II and PTs' experiences of the implementation of direct access in Study IV. Study II utilized qualitative, deductive, theory-driven (hypothetico-deductive reasoning model and the critical reflection model of King and Kitchener (1994) content analysis. Those two theories provided coding frames for the data analysis, which was carried out by two expert PTs who were familiar with the hypothetico-deductive clinical reasoning model, making the coding of the data easier for them. For the data analysis in Study IV, inductive interpretive content analysis was applied. Text from open-ended questions was categorized with themes and combined into subcategories with similarities. Two authors made this categorization first separately and then discussed them together. In the data analysis of Study IV, it was a question of interpreting the PTs' answers. For trustworthiness, therefore, it is essential to describe the process of data analysis as accurately as possible to establish the credibility of the data analysis and study results (Lincoln & Guba 1985, 47-54). This has been described in detail in each original article.

9.5 Clinical implications

The results of this study can be utilized for PTs' direct access practice as well as when planning the content of the education program for this practice.

Clients' and PTs' experiences of direct access practice provided important knowledge on the essential elements for this practice: There are client groups which need special concerns, such as retired clients, who mentioned the need for a longer follow-up and support procedures than this practice offered. Another client group was unemployed people, who probably needed better monitoring of the possible psychosocial stress factors connected with their experience of pain and its recurrence. These are important aspects to follow when implementing direct access practice in different parts of Finland. Client groups may differ in health care centers according to age division and the level of employment from those in this study, which was conducted in the southern part of Finland.

For the functioning of the new practice, PTs pointed to the importance of the whole community's commitment to direct access as well as to the continuing education and information for the new staff as well as for themselves. Functional collaboration with other health care professionals, such as physicians, triage nurses and other health care specialists, were also noted as being important.

Beginner PTs emphasized the length of appointments as a factor when starting the practice, suggesting that it needed to be longer than 60 minutes. A regular follow-up plan and the evaluation of implementation will be necessary to ensure the continuity and development of the new practice.

9.6 Future research

This research suggests a number of possibilities for future studies. There is a need, for example, to assess the possible recurrence of LBP over longer follow-up times as well as to compare the efficacy of different direct access content from the client point of view as well as cost effectiveness from the society's point of view. The possible differences between people in different parts of Finland should be assessed and considered, with additional focus on direct access practice. The same kind of studies as in this research could be conducted but with larger sample sizes for a broader evaluation of the achieved results. Particularly the whole physiotherapy process, from client assessment to the implementation of treatment and advice management, should be evaluated as part of PTs' core competences. The additional focus on the connection of psychosocial aspect should also be directed in biopsychosocial approach of LBP research.

10 CONCLUSIONS

The research demonstrates the benefits of direct access to PTs practice in the early phase of LBP, as outlined by clients and physiotherapist (satisfaction for PT's advice for pain care, decrease of fear of pain, low recurrence of pain, low re-visits to PT or physician and low number of sick leave days) and the use of tissue-structural classification at least as one of the classifications in this stage. Clinical reasoning and critical reflection competences in the assessment of clients were shown to be important during PTs' advanced or specialized practice and continuing learning of these competences should be included also in additional education programs.

The important competence of clinical reasoning with a hypothetico-deductive reasoning model was shown to be used at an acceptable level. In this study, the other crucial competence of PTs, critical reflection, was shown to have a significant role when assessing one's own skills and the need for continuing learning.

The experiences of implementation of direct access practice from the point of view of clients and that of PTs predict, that the aims of direct access were realized. Additionally, according to PTs' experiences, direct access practice increased their feeling about expertise with the satisfaction of clients, and their feeling of the meaningfulness and respect of their work. Still, further research is needed to confirm these preliminary results.

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APPENDICES

APPENDIX 1. QUESTIONNAIRE FOR CLIENTS

<p>1-8. Gender, age, weight, height, education etc.</p> <p>9. In your opinion is your general medical condition now</p> <p>10. Have you had other illnesses than low back pain?</p> <p>11. If you answered yes, please tell which:</p> <p>12. Have you sometimes previously visited a doctor due to back pain?</p> <p>13. Have you sometimes previously visited a physiotherapist due to back pain?</p> <p>14. Do you consider yourself to be physically active?</p> <p>15. Did you receive help for your back problem on your last visit at the physiotherapist?</p> <p>16. Did the physiotherapist give you a clear comprehensible explanation on the possible reasons for your back pain?</p> <p>17. Have you been able to perform the instructions on how to treat pain given to you by the physiotherapist?</p> <p>18. Were the instructions given to you by the physiotherapist comprehensible?</p> <p>19. Did the visit at the physiotherapist diminish the possible fear of pain?</p> <p>20. How many times did you visit the physiotherapist?</p> <p>21. Did your physiotherapist instruct you exercise on improving your physical functional ability at the follow-up visit?</p> <p>22. Have you performed the exercises instructed to you by the physiotherapist?</p> <p>23. Have you used some other exercises or treatments for your back pain than the ones instructed to you by the physiotherapist?</p> <p>24. If you answered yes to the previous question, please describe briefly which exercises or treatments you have used.</p> <p>25. Has your back problem/pain recurred after your visit at the physiotherapist?</p> <p>26. If you answered yes, please tell how soon the pain recurred after your first visit at the physiotherapist?</p>	<p>Background</p> <p>1-5 (1=very good, 5=very poor)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-3 (1=very much, 2=moderate, 3=not at all) 1-5 (1=very much, 5=not at all)</p> <p>1-5 (1=very well, 5=not at all)</p> <p>1-5 (1=very well, 5=not at all)</p> <p>1-3 (1=very much, 2=moderate, 3=not at all)</p> <p>1-3 (1=very much, 2=moderate, 3=not at all)</p> <p>1-5 (1= very much, 4=not at all, 5=I was not frightened)</p> <p>1-4 (1=one, 2=two, 3=three, 4=more than three)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=partly, 3=no)</p>
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<p>27. If the same back problem has recurred, have you been able to use the previous instructions given to you by the physiotherapist?</p> <p>28. Are you currently on sick leave because of the same a back problem?</p> <p>29. If yes, please describe briefly in what functions the back pain is disturbing:</p> <p>30. Have you made a repeat visit at the physiotherapist because of recurrence of the back problem?</p> <p>31. Have you consulted a doctor because of recurrence of the back problem after having visited a physiotherapist?</p> <p>32. If you answered yes, what treatment did the doctor subscribe you?</p> <p>33. Are you currently taking painkillers for your low back pain?</p> <p>34. If your back problem has still occurred or recurred, what are your perceptions on the reasons? Please describe with own words:</p> <p>35. Other thoughts you would like to bring to our attention for us to develop our operation:</p>	<p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=no)</p> <p>1-2 (1=yes, 2=no)</p>

APPENDIX 2. QUESTIONNAIRE FOR PHYSIOTHERAPISTS

Physiotherapists' direct access for musculoskeletal patients' questionnaire 2018

Background questions

Answer questions by marking X in the appropriate box (gender), or in numbers (year)

1. female 2. male
3. Physiotherapist graduation year
4. Years of direct access training
5. How long you have practiced direct access
 <1 mo 1-2 mo 1 y. >1 y (number of years)
6. number of clients per week:
 <10 11-20 >20
7. What musculoskeletal disorders you treated the most? Rank in order in the boxes below: 1, 2, 3, 4
 - a. low back
 - b. neck
 - c. upper limbs
 - d. lower limbs
8. How is the possibility of a medical consultation organized?
 by phone if necessary
 face-to-face with MD
 other
 what? _____
9. Duration of client's disorder? Rank in order in the boxes below: 1, 2, 3
 - a. acute (<6 w)
 - b. subacute (6-12 w)
 - c. chronic (>12 wk)
10. For how many clients have you consulted with a physician in the last month?
11. If you have consulted the physician, what has been the reason?
 - a. client had indications of a serious illness
 - b. disorder has been unclear
 - c. medication review



ORIGINAL PAPERS

I

KNOWLEDGE TRANSLATION FROM CONTINUING EDUCATION TO PHYSIOTHERAPY PRACTICE IN CLASSIFYING PATIENTS WITH LOW BACK PAIN

by

Eira Karvonen, Markku Paatelma, Jukka-Pekka Kesonen &
Ari O Heinonen 2015

Journal of Manual and Manipulative Therapy, 23 (2), 68–74. DOI:

<http://doi.org/10.1179/2042618614Y.0000000091>

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II

CLINICAL REASONING AND CRITICAL REFLECTION IN PHYSIOTHERAPISTS' EXAMINATIONS OF PATIENTS WITH LOW BACK PAIN IN ITS EARLY PHASE: A QUALITATIVE STUDY FROM PHYSIOTHERAPISTS' POINT OF VIEW

by

Eira Karvonen, Markku Paatelma, Sirpa Laitinen-Väänänen, &
Arja Piirainen 2017

European Journal of Physiotherapy 19 (4), 185–193.

DOI: <https://doi.org/10.1080/21679169.2017.1316311>

Request a copy from the author.

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III

**ASIAKKAAN KOKEMUKSIA FYSIOTERAPEUTIN
SUORAVASTAANOTOSTA SELKÄKIPUJEN
VARHAISVAIHEESSA.
RETROSPEKTIIVINEN KUVAILEVA KYSELYTUTKIMUS**

by

Eira Karvonen, Markku Paatelma & Ari Heinonen 2017

Kuntoutus-lehti 40 (3-4), 34-43.

<https://kuntoutussaatio.fi/julkaisut/kuntoutus-lehti/arkisto/kuntoutus-3-42017/>

Painettu Kuntoutussäätiön luvalla.



IV

PHYSIOTHERAPISTS' EXPERIENCES OF DIRECT ACCESS FOR CLIENTS WITH MUSCULOSKELETAL PAIN AND DYSFUNCTION: A QUALITATIVE STUDY

by

Eira Karvonen, Sirpa Laitinen-Väänänen, Markku Paatelma,
Minna Roine & Ari Heinonen 2019

European Journal of Physiotherapy

DOI: <https://doi.org/10.1080/21679169.2019.1636133>

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