The University Of Sheffield.

Developing a functional outcome measure for individuals with low back pain within a Jordanian physiotherapy service

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Abstract

Low back pain (LBP) is a chronic condition that leads to disability and work absence. It affects patients' lives regardless of their age, gender, social status, level of education or culture. After the common cold, LBP is the second condition that results in health seeking behaviour and has a consequential social burden, as well as a global burden, on the health economy. Limitations in physical functioning arising from LBP affect other dimensions of quality of life, such as mental and social functioning. Therefore, LBP is considered a multidimensional problem.

Targeted physiotherapy interventions are used to improve functional outcomes in individuals with LBP. However, a number of problems exist on the measurement of the effectiveness and efficiency of these complex interventions in a clinical context. A valid, reliable and responsive outcome measure that is underpinned by theoretical and clinical knowledge is required to address these issues.

The aim of this thesis is to develop a clinical measure suitable for research and for implementation in the Jordanian healthcare system for the measurement of functional outcomes in people with LBP. The research process involved three phases, namely, conceptualisation of the problems, development of the measurement tool and clinical testing of the measurement tool.

Different research methods were used in this research programme to achieve the objectives. In the conceptualisation phase, a systematic review of the global prevalence of LBP was conducted to compare the prevalence of LBP in different countries with that in Jordan. This process was followed by a meta-synthesis of qualitative studies that investigated the impact of LBP on people's lives, as well as of critical reviews of management models of LBP, theory of measuring scales and scaling methods. These reviews resulted in the development of a theoretical framework to measure functional status in individuals with LBP and the identification of measurement standards in a clinical context. This framework was used at the end of the conceptualisation phase to critically review six of the most commonly used LBP outcome measures. After the conceptualisation phase, a new outcome measure of functional performance in individuals with LBP was determined to be necessary.

A mixed-methods approach was used in the development of the measurement tool phase. The Treatment Evaluation by LE Roux (TELER) method of measurement was utilised in the development and validation of a new outcome measure of functional performance, in which rigorous and extensive qualitative methods, such as in-depth interviews and nominal group techniques, were used.

In the clinical testing phase, the TELER LBP indicators were tested in Jordanian physiotherapy clinics. This testing provided evidence of the clinical utility of the TELER LBP indicators in generating informative data appropriate to inform clinical decision-making. This thesis has contributed to the development of measurement in the musculoskeletal field by providing a new clinical tool that is underpinned by sound theoretical, clinical and empirical knowledge. The tool is appropriate for use in clinical evaluation and has potential use in research. This thesis provides a solid base upon which further new knowledge can be developed in the future.

List of Abbreviations

BP	Back Pain
BJD 2000-2020	Bone And Joint Decades 2000-2020
CNS	Central Nervous System
X^2	Chi-square
CBP	Chronic Back Pain
CLBP	Chronic Low Back Pain
R^2	Coefficient of determination
CPD	Continuing Professional Development
α	Cronbach's alpha
df	Degree of Freedom
EBP	Evidence-Based Practice
ICF	International Classification Of Function, Disability And Health
LBP	Low Back Pain
MeSH	Medical Subject Headings
MCID	Minimal Clinically Important Difference
NHS	National Health Services
NRS	Numeric Rating Scale
ODI	Oswestry Disability Index
PROMs	Patient Reported Outcome Measures
QBPDS	Quebec Back Pain Disability Scale
RMDQ	Roland Morris Disability Questionnaire
SMS	Short Message Service
r_s	Spearman's Correlation
TELER	Treatment Evaluation By LE Roux's Method
VRS	Verbal Rating Scale
VAS	Visual Analogue Scale
K_W	Weighted Kappa
WCPT	World Confederation For Physical Therapy
WHO	World Health Organization

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Overview of the thesis

The 2010 Global Burden of Disease study suggested that the prevalence of chronic disorders is escalating (1,2). Chronic conditions, such as low back pain (LBP), present an economic burden on any healthcare system because they affect many individuals regardless of age, gender or social status (3). Studies showed that LBP as a symptom also has a social burden because it affects almost all people at some point in their lives (4), and it is the leading cause of disability and work absence (1,2). LBP affects many dimensions of one's quality of life, such as physical functioning, mood and social functioning (5), which in turn result in complex cases.

Mounting evidence supports the view that such a multidimensional disorder requires targeted multidimensional physiotherapy interventions (6). The delivery of these physiotherapy interventions occurs in clinical, community and home settings (7). The overall aim of physiotherapy is to reduce the impact of pain and improve the functional status of individual patients (8).

Many measurement tools have been developed to evaluate the effectiveness and efficiency of physiotherapy interventions (9). These measurement tools were originally created for research and audit purposes, but they were recently used by clinicians to measure outcomes in a clinical context often called a service evaluation (10). The measures used to inform research and audit involve the data collected, aggregated and analysed at the group level (11,12). Different studies indicated that measurement tools, which possess adequate psychometric properties at the group level and perform satisfactorily in the measurement of outcomes in clinical trials, are not necessarily suitable for the evaluation of clinical outcomes at the level of the individual in a clinical context (13-16). Data collection in research aims mainly to generate generalisable findings, and in the clinical context, data collection aims to inform individual care (10,17,18).

In addition to this concern, the majority of measurement tools were developed in English-speaking countries, and they were cross-culturally adapted to other languages. A recent review of these cross-cultural adaptations of measures showed that only two tools were translated into the Arabic language (9). This factor may be one of the reasons why an evidence-based culture is almost non-existent in other countries, such as Jordan. A recent study conducted in Jordan (19) suggested that evidence-based practice (EBP) is not

implemented in Jordan for many reasons, such as lack of resources, lack of time because of patient overload, inadequate research skills and lack of outcome measures. Such outcome measures should be appropriate to the context and the population within which it will be implemented.

This thesis proposes that an appropriate measurement tool that measures what is important to Jordanian individuals with LBP improves the quality of care delivered to the individual patient, enhances the care experience, facilitates clinical decision-making and ultimately improves the effectiveness and efficiency of the care provided to whole groups of patients.

Therefore, this research programme seeks to respond to both of the aforesaid concerns and develop a clinical tool for the measurement of outcomes that are important to a patient during physiotherapy. This thesis suggests that an appropriate outcome measure in a clinical context should be valid, reliable and responsive to change or the lack of change. The data collected can inform clinical decision-making at the individual level and can be aggregated to provide information at the group level for managers, policymakers or commissioners about the quality of healthcare services provided to patients. The overarching purpose of this thesis is to stimulate and promote an EBP paradigm in the physiotherapy field in Jordan through the development of an appropriate LBP outcome measure. The overarching aim of this thesis is in line with the current ongoing significant reforms in the Jordanian healthcare system to implement EBP in clinical decision-making (20-22). The purpose of these reforms in the healthcare sector in Jordan is to provide high-quality and cost-effective care for individuals with chronic conditions, such as LBP.

The premise for the first section in the first phase of this thesis is that understanding the trajectory of LBP, the impact of LBP on individuals' quality of life, the management models used and the constructs that are often measured after therapy is the key to the development of an appropriate LBP measurement tool (23,24). This information ensures clarity about what should be measured and how it should be measured (23,24).

The theory of measuring scales, scaling methods and the quality criteria required by a measurement scale in order to have clinical utility were reviewed in the second section in the first phase. These reviews were conducted to synthesise current literature into a framework for the specifications of an appropriate outcome measure for implementation in a clinical context. This new theoretical framework constitutes an integral component

upon which current LBP outcome measures were critically reviewed in Chapter 7. The purpose of these critical reviews was to determine whether current measures meet the requirements of measurement in a clinical context. Chapter 7 identified a number of issues in current LBP outcome measures, such as the use of double-barrelled questions, lack of responsiveness, and floor and ceiling effects. None of the instruments reviewed showed that they had the required characteristics to be used in a clinical context nor the ability to detect change over time.

Based on the findings of the first phase, a new outcome measure was developed in the second phase. The development phase involved selecting an appropriate method of measurement that met the specifications of measurement in a clinical context and the qualitative exploration of Jordanian patients' experience of living with their problem. The TELER method of measurement was selected in this thesis to develop the new measurement tool because it conformed to the specifications of the construct functional performance, the rules of the levels of measurement and the standards of measurement in a clinical context. Patients' narratives were used to develop the first draft of TELER LBP indicators. This process was followed by the validation and calibration of the new outcome measure with the use of a nominal group technique, which utilised clinicians' clinical knowledge in calibrating the TELER codes to represent, as closely as possible, recovery patterns.

The clinical testing phase involved testing the indicators in Jordanian physiotherapy clinics. The purpose of this phase was to examine the measurement properties and clinical utility of the TELER LBP questionnaire in a Jordanian clinical context. Figure (1.A) shows the structure of this thesis.

A mixed-methods approach that used a triangulation of qualitative and quantitative methods was utilised to achieve the different objectives in this research programme (see Figure 1.B). Further objectives (see Figure 8.1) are integrated within each chapter in the second and the third phases. The method sections were distributed and integrated within each chapter in this thesis.

Figure 1.A: Overview of the structure of this thesis

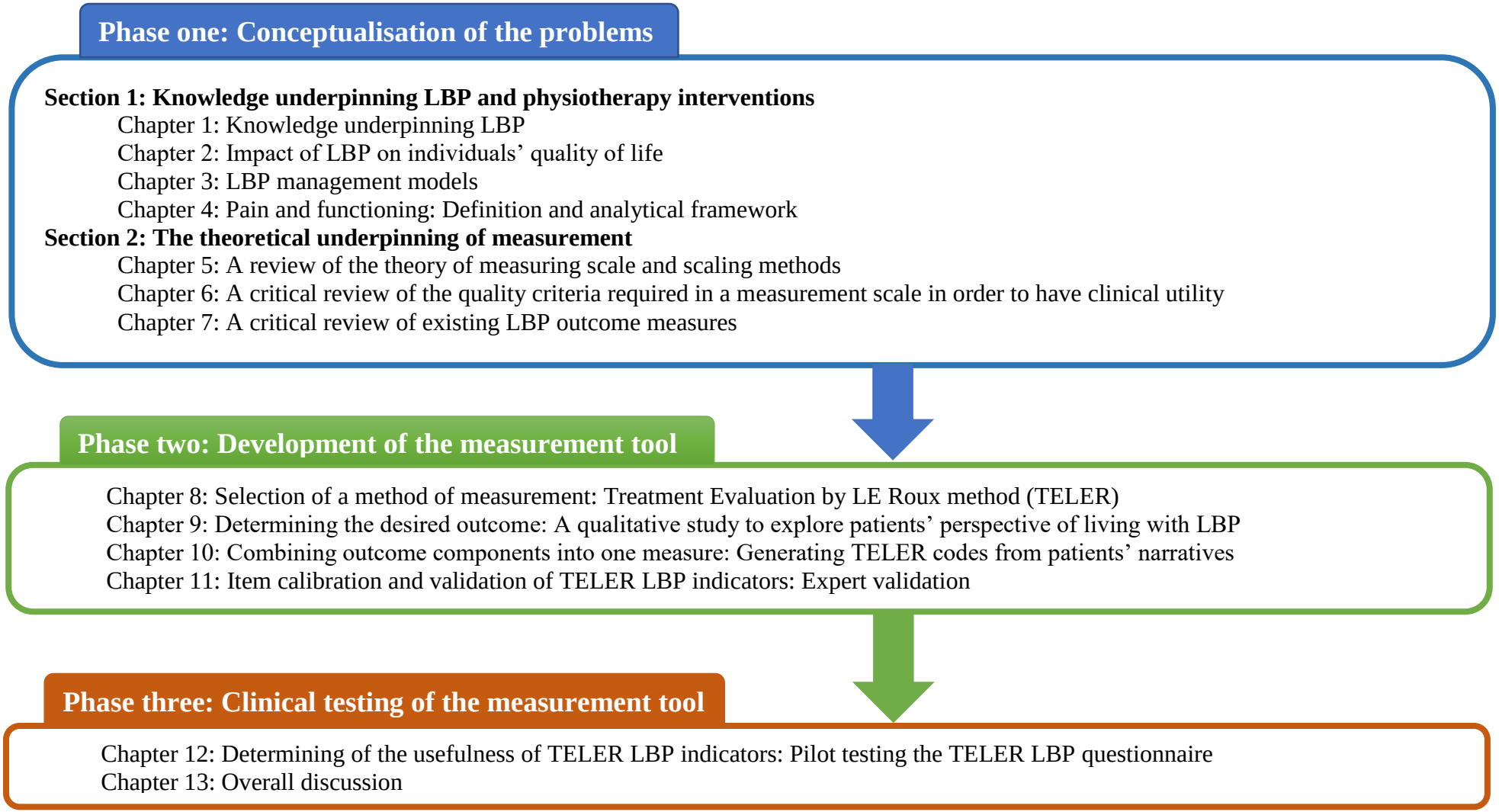
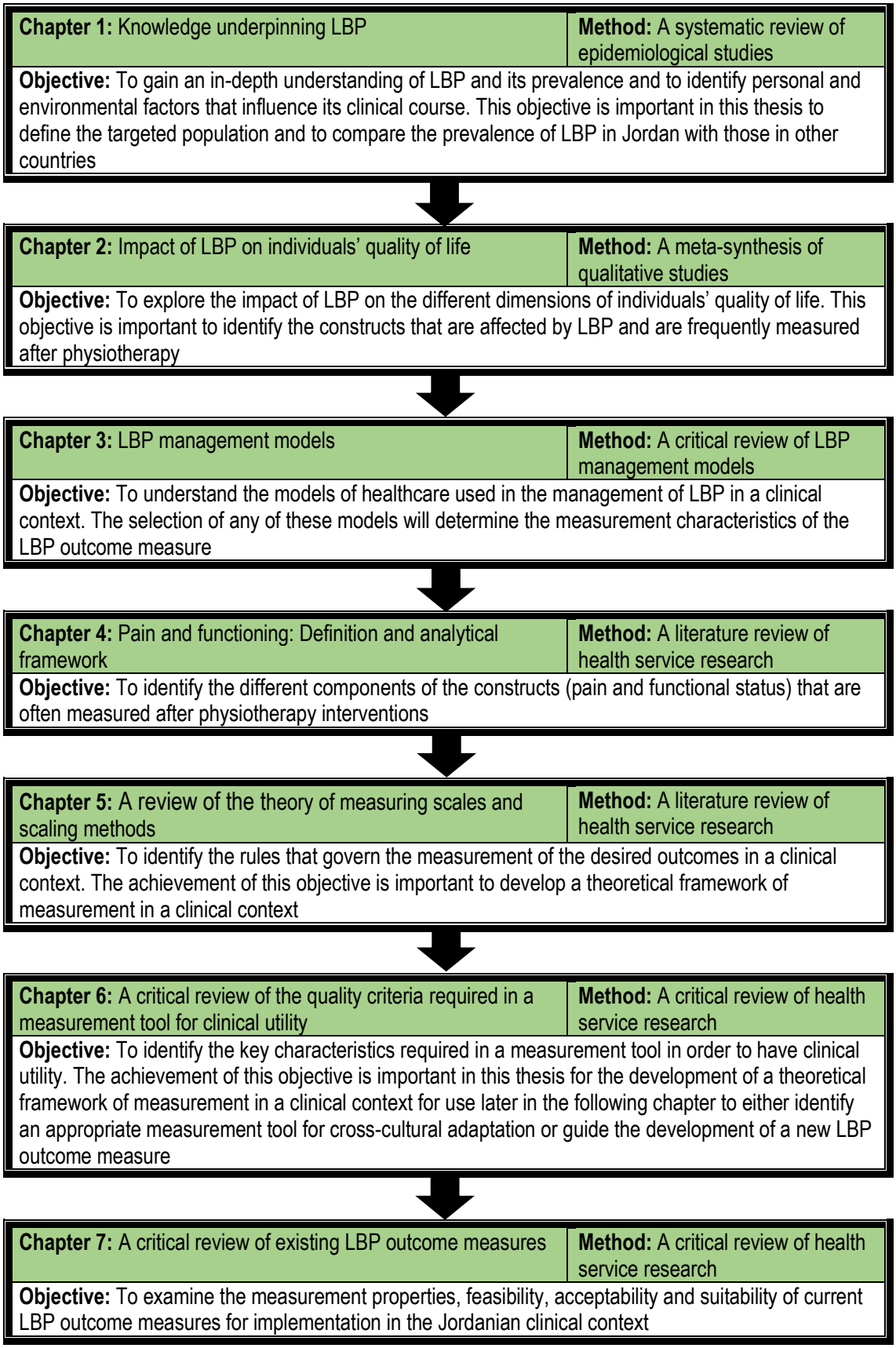


Figure 1.B: Overview of the objectives and methods of the first phase



Further objectives are displayed in Figure 8.1

Phase 1: Conceptualisation of the problems

Section 1: Knowledge underpinning LBP and physiotherapy interventions

Chapter 1: Knowledge underpinning low back pain

Chapter 2: Impact of LBP on individuals' quality of life

Chapter 3: LBP Management models

Chapter 4: Pain and functioning: Definition and analytical framework

Section 2: The theoretical underpinning of measurement

Chapter 5: A review of the theory of measuring scale and scaling methods

Chapter 6: A critical review of the quality criteria required in a measurement tool for clinical utility

Chapter 7: A critical review of existing LBP outcome measures

Overview of phase 1: Conceptualisation of the problems

Little is known about the prevalence of LBP in Jordan. The first chapter in the conceptualisation of the problems phase responded to this gap in the literature through the conduct of a systematic review of the global prevalence of LBP. The prevalence of LBP in Jordan was compared against that in other countries. This systematic review was important in this thesis because it also identified the characteristics of the targeted population, as well as the personal and environmental factors that influence the trajectory of LBP. These factors were considered during the planning of the subsequent phases in this thesis.

This step was followed by a report on the findings of a recent meta-synthesis of qualitative studies that explored the impact of LBP on individuals' quality of life. Such a report was important in this thesis to identify any qualitative study conducted in Jordan that explored the impact of LBP on individuals' quality of life. The second chapter in this thesis indicated that no qualitative study has been conducted in Jordan on the impact of this problem on the Jordanian population. Therefore, this thesis responded to this gap in the literature during the development of the measurement tool phase by conducting a rigorous qualitative study that explored the Jordanian people's perspective of living with LBP.

The third chapter in this thesis reviewed LBP management models. The purpose of the critical review was to identify the role of LBP management models in the development of outcome measures. Chapter 4 in this thesis reviewed the different dimensions that are frequently measured after physiotherapy. The findings of this chapter were important in this thesis to determine what should be measured after physiotherapy. The findings of Chapter 4 suggested that compared with the impact of the other dimensions of pain, that of pain on one's functional status can be observed by a clinician and reported by a patient; therefore, this construct was considered during the development of the measurement tool phase.

The purpose of the second section in the conceptualisation of the problems phase was to develop a theoretical framework of measurement in a clinical context. This new framework was used to critically appraise current and most commonly used LBP outcome measures in order to select an appropriate measurement tool for use in a clinical context in Jordan. A critical review of the literature indicated that an appropriate LBP clinical measurement tool does not exist in the musculoskeletal literature. This thesis responded to this gap in the literature by developing a new, appropriate outcome measure suitable for implementation in a clinical setting. Critical reviews of the theory of measuring scales and scaling methods were conducted to develop this theoretical framework (Chapter 5). This process was followed by a critical review of the health services research literature to identify the theoretical principles of measurement in a clinical context (Chapter 6).

Chapter 1: Knowledge underpinning low back pain

Key points in Chapter 1:

- LBP is a prevalent condition (point prevalence = 25%–47.7%) that affects individuals regardless of age, gender or socio-economic status. The reported recurrence rates of LBP are high (40%–50%), so LBP is one of the costliest health problems. Little is known about the prevalence of LBP in Jordan and the impact of this condition on the Jordanian population. Therefore, this thesis aims to explore the impact of LBP on the Jordanian population.

- The systematic review of the global prevalence of LBP in this thesis indicated that the majority of epidemiological studies did not use valid and reliable tools in the measurement of the prevalence of LBP, which is a clear gap in the current knowledge on LBP. The use of these invalid tools might distort the current understanding of LBP.

1.1 Introduction on the low back pain problem

Musculoskeletal pain is a problem that affects people globally; the prevalence of this pain increases with age (3,4,25), and it has an impact on individuals' quality of life (4,26-29). The World Health Organization (WHO) initiated Bone and Joint Decades 2000–2020 (BJD 2000–2020) in recognition of the significant burden posed by musculoskeletal disorders (30). BJD 2000–2020 is the only international initiative that brings together relevant stakeholders to focus on musculoskeletal problems and raise awareness of these conditions at the global, regional and state levels. The primary mission of this international movement is to decrease the burden of musculoskeletal problems on individuals, healthcare systems and society through (31):

1- "*Raising the priority for musculoskeletal conditions on the global and national health agenda*.
2- *Raising awareness of public and policymakers of the burden of musculoskeletal conditions and what can be achieved by implementing effective prevention and treatment.*
3- *Increasing knowledge of the suffering and cost to society associated with musculoskeletal conditions.*
4- *Empowering people to gain priority for their own care.*
5- *Improving access to cost-effective prevention and treatment.*
6- *Increasing research that will advance understanding of musculoskeletal disorders and improve prevention and treatment".*

Disorders of the spine are the most prevalent problems within the musculoskeletal field (32-41). Furthermore, LBP[1] is the most reported spinal complaint (26,28,33,34,42-53). Interestingly, LBP as a symptom affects many people around the world regardless of age, gender, socio-demographic characteristics or behaviour (3,4,54,55).

[1] Unless otherwise stated in the text, the abbreviation 'LBP' refers to non-specific chronic LBP.

Any abnormalities within the anatomical structures, such as the bones, blood vessels, neural or ligamentous structures, muscles, joints or inter-vertebral discs, may or may not be associated with the development of a new episode of LBP. Many studies indicated the poor association between diagnostic imaging, which shows degenerative changes within the spinal column, and reporting pain in the lower back (55-57). However, approximately 5%–15% of causes, such as fractures, degeneration or inflammation, can be directly related as an origin of LBP, whereas the remaining 85%–95% of cases are diagnosed as non-specific[2] LBP or LBP of an unknown cause (55,58-60).

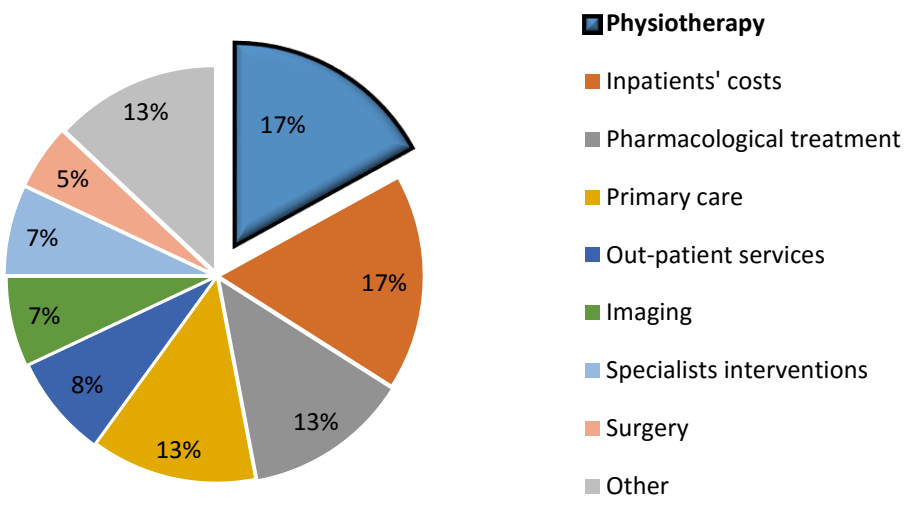
Many epidemiological studies report that more than 80% of individuals around the world suffer from LBP at a certain point in their lives (4,42,55,61,62). Furthermore, LBP is an economic burden on any healthcare system, and a huge amount of money is being spent each year on the management of LBP (63-65).

Dagenais *et al.* (65) reported in a systematic review of 14 studies conducted in different countries that physiotherapy accounts for an average of 17% of the overall direct amount spent on the management of LBP (Figure 1.1). Furthermore, studies that investigated the healthcare cost in different countries reported that LBP is a problem that leads to huge economic burden (64,66,67). For example, the direct costs (healthcare services) of LBP were estimated at €2.6 billion and the direct medical costs at 6.1% of the total healthcare expenditure in Switzerland. Indirect costs (productivity losses) were estimated at €4.1 billion. The total economic burden of LBP to Swiss society was between 1.6% and 2.3% of the gross domestic product (67). Another study conducted in the Netherlands on the cost of LBP in 2007 reported direct and indirect costs of €3.5 billion (68). Both studies indicate that the indirect costs of LBP, such as production losses because of limitations in physical activities, represented approximately two-thirds of the overall economic burden of LBP.

Dagenais *et al.* (65) reported that the majority of studies investigating the economic burden of LBP were conducted in developed and high-income countries, such as the UK, US, Australia and Japan. By contrast, little is known about the economic burden of LBP in developing countries, such as Jordan, in terms of disability, work absence or medical healthcare costs.

[2] Non-specific LBP is defined as 'LBP [that is] not attributable to a recognisable, known specific pathology' (55), p. 482.

Figure 1.1: Overall costs of management of LBP



Dagenais *et al.* (65) reported that physiotherapy services account for a significant proportion of the money spent on the management of LBP. Despite the fact that LBP affects many individuals, different studies (69-71) indicated that a small but significant group of people with severe disability arising from LBP account for the majority of the economic burden. Regardless of their disability level, many individuals seek physiotherapy services for their LBP (65). Nearly one physiotherapist is allocated in Jordan for every 10,000 people (72). Generally, health professionals in Jordan rarely search for evidenced-based interventions to use in their practice because of a variety of reasons, including patient overload, limited resources and absence of suitable outcome measures (19). Valid, reliable, responsive and culturally sensitive outcome measures are required to collect data that inform practice and decision-making (73,74). The impact of LBP on the Jordanian people is unclear. Furthermore, because of the lack of suitable outcome measures, other health professionals, such as medical doctors, attribute changes in patient health status to their interventions and not to physiotherapy interventions. Therefore, Jordanian physiotherapists may be in urgent need to conduct research and demonstrate their achievements by using scientific outcome measures and appropriate research designs.

The Science Council (75) in the UK defines science as "*the pursuit of knowledge and understanding of the natural and social world following a systematic methodology based on evidence*". The current study aimed to stimulate or enhance the EBP paradigm in Jordan by developing an appropriate outcome measure. The word 'appropriate' is defined in the Cambridge dictionary as "*suitable or right for a particular situation or occasion*".

This definition implies that to achieve the overall goal of this thesis, this research should identify the targeted population within which the outcome measure will be implemented, as well as identify the theoretical underpinning of measurement in a clinical context (76). The characteristics of the targeted population will be discussed in further detail in the following subsections. However, discussing first the concept of EBP at this stage is important.

1.2 Evidence-based practice

Sackett (77), p. 71, defines EBP as "*the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research*". The previous definition indicates that EBP is the incorporation of the best research evidence, clinical expertise and patient goals into the clinical decision-making process. EBP has become the acceptable practice among healthcare professions across the world (78), including physiotherapy (73). EBP indicates that research and evidence, not solely therapist preference, should guide treatments and clinical decisions. Furthermore, high-quality research is needed to provide valid evidence, based upon which a therapeutic intervention can be evaluated and prescribed (12,79).

Physiotherapists in Jordan do not possess the means that empower them to prove the effectiveness and efficiency of their interventions through scientific evidence. This phenomenon can be attributed to a long tradition of research that does not exist in Jordan and to a critical mass of clinical knowledge that is still emerging in some areas of clinical practice, such as nursing (80), and not existing at all in others, such as physiotherapy. Furthermore, the profession of physiotherapy in Jordan is still residing under the auspices and protection of the medical profession, a factor that has led to its lack of professional autonomy (81). Physiotherapists in Jordan are obligated to practice their profession under physicians' orders. Therefore, the use of research findings in Jordan to inform the choice of techniques is limited. The factors that Jordanian physiotherapists use to select interventions include their professional education, attendance of continuing professional development (CPD) courses, previous experiences with a patient or following peer recommendations. No obligation that involves the profession of physiotherapy exists to demonstrate the effectiveness and efficiency of an intervention before its inclusion in an undergraduate course or in the area of CPD (82). This situation may be one of the reasons

that have led to the inconsistency in the provision of physiotherapy services. The absence of appropriate measurement tools in the Arabic language presents a challenge in providing evidence that supports the effectiveness of physiotherapy interventions.

Variations do exist in physiotherapy practice (83); individuals who present with very similar symptoms may be treated in different ways depending on the treating clinician and the clinical context they are treated in (55,84). This reality might suggest the importance of treating people with LBP through evidence-based interventions rather than through therapists' preference, habits or traditions (83,85,86).

Physiotherapists are keen to establish the clinical effectiveness[3] of the various interventions they use in their clinical practice (73,79,87). Healthcare providers, managers and commissioners are encouraged to base their decisions on evidence-based interventions or clinical guidelines. For example, the guideline developed by the National Institute for Health and Care Excellence for the management of non-specific LBP (88) include both expert opinions and evidence of the effectiveness or efficiency of various types of complex physiotherapy interventions (84).

In the healthcare field, information and evidence can be generated from three types of data collection activities, which are clinical audit, research and service evaluation (79). Table (1.1) defines these activities and shows the purpose of conducting each of these data collection activities.

Information is achieved through a clinical audit. The aim of a clinical audit is to ensure that the effectiveness of healthcare services meets the agreed high-quality standards. A clinical audit is considered a continuous cycle of measurements that help policymakers take actions to bring practice in line with these high-quality standards and thus enhance the quality of care and health outcomes (89). The second type of evidence is achieved through empirical studies. These studies generate new knowledge that helps in practice development or guides future research.

[3] Mawson defines effectiveness as 'The ability of the healthcare practitioner, multidisciplinary team or organisation to produce results or outcome, i.e. extent to which the recovery potential is achieved' (87).

Table 1.1 Comparisons between different data collection activities

Data collection activity	Purpose
Clinical audit	Measures existing practice against evidence-based clinical standards. This typically involves measuring both process and outcomes at the same time.
Research	Generates new knowledge where there is no or limited research evidence available and which has the potential to be generalisable or transferable
Service review	Service/practice evaluation: Evaluates the effectiveness or efficiency of an existing or new service/practice that is evidence based, with the intention of generating information to inform local decision-making.
	Service/practice development: Introduces a change in service delivery or practice for which there is evidence derived from research or from other health/social care settings that have already introduced and evaluated the change.

Adapted from Brain et al.(89)

The third data collection activity is service review, which incorporates both service evaluation and service development. Service evaluation is used to evaluate current practice. Both research and service development might lead to the development of healthcare services (79). However, research is frequently used to investigate the *effect* of a new treatment on a specific group of patients. In research, a group of individuals with specific characteristics is recruited to be randomised later into at least two groups. The randomisation element in research is important to establish the causal relationship between the effect of a particular treatment and the pre-specified outcome. Furthermore, research tests a hypothesis mathematically to determine the probability of the change in a patient's outcome being a random event or a result of the new treatment (89). The research results might be generalisable and transferable to other healthcare settings. On the other hand, service development uses rigorous methods to provide evidence of the effectiveness or efficiency of the treatment in a clinical context. Service development aims to investigate individuals' response to therapeutic intervention in a real clinical situation (89). Compared with research, service review does not aim to establish causality; it aims to establish the best treatment. Both types of studies are important in decision-making to provide evidence for therapy effectiveness and efficiency.

As mentioned earlier in this section, a long tradition of research does not exist in Jordan because of a number of factors, such as difficulties in designing studies and the lack of appropriate measurement tools. Therefore, commencing the research through an evaluation of the current healthcare services provided by physiotherapists in Jordan for individuals with LBP is appropriate. This research programme aims to respond to this shortcoming in the Jordanian healthcare system by developing an appropriate outcome measure that can be used in both research and clinical practice to provide information to inform clinical decision-making.

1.2.1 Outcome measures in physiotherapy

In physiotherapy, two types of outcome measures are used, namely, generic and condition-specific outcome measures. Binkley *et al.* (90), p. 372, defines generic measurement tools as measures that "*assess overall health, including social, emotional, and physical health status, and are intended to be applicable across a broad spectrum of diseases, interventions, and demographic and cultural subgroups*". Condition-specific measures, also called 'disease-specific measures', are designed to "*assess attributes that are most relevant to the disease or condition of interest. Ideally, disease-specific measures are composed of items that are frequently affected by the condition of interest and that are likely to demonstrate clinically important change*" (90), p. 372. Compared with condition-specific measures, generic measures do not focus on issues of particular interest to individuals with a specific condition (91). Therefore, condition-specific measurement tools have a greater utility in clinical practice at the individual level to inform clinical decision-making than do generic instruments because condition-specific measurement tools are designed to capture clinically important changes.

Individualised measurement tools are required because individual patient preferences significantly vary, and consequently, patient goals are idiosyncratic. Thereby, capturing what individual patients perceive as important might be valuable in the design of pertinent outcome measures (91).

In the examination of LBP within the Jordanian context, a number of studies indicated that LBP is a major problem in Jordan that leads to physical and psychological problems (92-95). The burden of the problem suggests the importance of further research within the Jordanian clinical context to understand the impact of LBP on individuals and monitor changes in their health status after physiotherapy interventions. The generation of appropriate evidence on the effectiveness of physiotherapy practice in Jordan requires the implementation of appropriate outcome measures (96).

Therefore, the research process presented in this thesis covered the two main approaches that will enable the achievement of the overarching aim of this thesis. The first approach requires critically appraising current LBP outcome measures to select an appropriate measurement tool for cross-cultural adaptation into Arabic language and then testing it in a Jordanian clinical context. The second approach will require, in the instance of the absence of a suitable current LBP measurement tool [Chapter 7], the utilisation of a

mixed-methods approach that will enable the development of a new LBP outcome measure and its clinical testing it in a clinical context. However, before the critical appraisal of current LBP outcome measures, understanding LBP [Chapter 1], the impact of LBP on individuals' quality of life [Chapter 2], the healthcare models used in the management of LBP [Chapter 3] and the dimensions that are often measured after physiotherapy is equally important [Chapter 4]. These aspects play a key role in the development of outcome measures.

The next subsection will explore the epidemiology of LBP within the Jordanian context and compare the data gathered from different population-based epidemiological studies conducted worldwide and in Jordan. This is important in this thesis because little is known about the epidemiology of LBP in Jordan.

1.3 Epidemiology of LBP

1.3.1 Background

To fill this gap in the literature, the following subsection aims to define the targeted population, explore the prevalence of LBP and determine the personal and environmental factors that affect the clinical course of LBP. Doing so is important to understand the similarity and differences between the Jordanian context and that of the rest of the world.

Epidemiology is defined as "*the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems*" (97). To obtain a general understanding of LBP epidemiology, this subsection covered LBP topography, prevalence and clinical course. A systematic search was used to identify the studies that were conducted in Jordan and worldwide on the prevalence of LBP in the general population.

Hoy *et al.* (3) conducted a systematic review by using Cochrane and meta-analysis of observational studies in epidemiology (MOOSE) guidelines. The research was conducted by the first author, and the findings were reviewed for thoroughness and accuracy by an independent researcher according to pre-set eligibility criteria. The search strategy was well illustrated, so replicating and tracing the search process is easy (98).

In Hoy's review, publications from 1980 to 2009 were searched in several appropriate databases, such as MEDLINE, EMBase and CINAHL. A scoping review identified that many epidemiological studies were published subsequent to the last systematic review of Hoy (3). These more recent epidemiological studies reported the prevalence of LBP and the associated personal and environmental factors in different regions around the world, including low- and middle-income countries. The last systematic review of the global prevalence of LBP did not include any study that reported the prevalence rates of LBP in Jordan. To examine the LBP prevalence rates in Jordan, this research programme updated the systematic review of Hoy et al. (3), replicated the methods used and applied the MOOSE and Cochrane Collaboration recommendations (99,100). Doing so is important to critically review publications on LBP prevalence between January 2009 and May 2014. The next subsections will present the search strategy and the findings of the new systematic review.

1.3.2 Method

This systematic review was conducted with the use of a predetermined protocol in accordance with the Cochrane Collaboration recommendation (101) and the PRISMA statement (102).

1.3.2.1 Data sources and search strategy

CINAHL Plus, CINAHL complete, Health Source: Nursing/Academic Edition, MEDLINE, Scopus, EmBase and different combinations of MeSH keywords and Boolean logic were used (Table 1.2). The electronic search was complemented by hand through a search of the reference lists of the studies found. This process was undertaken by TA and verified by a second reviewer (AA[4]).

Table 1.2: MeSH keywords

Condition (AND)	Epidemiological parameter (AND)	Targeted population (AND)
back pain (OR) lower back pain (OR) back ache (OR) backache (OR) lumbago	Prevalence (OR) incidence (OR) frequency (OR) occurrence (OR) surveillance	general population (OR) community (OR) population-based (OR) dwellings

MeSH: Medical Subject Headings

[4] Mr. Ahmed Adem is a musculoskeletal physiotherapist who is doing a PhD in Sheffield Hallam University in the LBP field.

1.3.2.2 Study selection

Epidemiological studies needed to meet the following criteria to be included:

1.3.2.2.1 Participants

Studies on adult individuals (>18 years old) presenting with signs and symptoms suggestive of LBP, defined as activity-limiting LBP (with/without pain referred into one or both lower limbs) that lasts for at least 1 day were considered for inclusion. If the studies did not specify episode duration but did specify the anatomical location of the pain, these studies were included. This review aims to explore the prevalence of LBP in the working population; therefore, studies that recruited individuals who are older than 18 years were included. Those studies that estimated the prevalence of LBP in a specific population, such as nurses, were excluded. This step is important to ensure the generalisability of the results. Non-population-based studies were excluded because they were not representative of the national population, and they might limit any attempt to describe disorder patterns in a country. Studies that reported only pain from feverish illness/menstruation or were limited to a subset of individuals with LBP were excluded.

1.3.2.2.2 Study design

All population-based cross-sectional or longitudinal cohort studies published between January 2009 and May 2014 in which the prevalence of LBP was reported were considered for inclusion.

1.3.2.2.3 Language

The author of this thesis has a good command of both the English and Arabic languages. Articles written in other languages were therefore excluded.

Two reviewers (TA/AA) independently assessed the titles and abstracts of all retrieved references to identify the studies that appeared to meet the inclusion criteria. The reviewers later agreed upon the studies that should be retrieved for full-text review. In the case of disagreement, a third reviewer (CL[5]) was available to arbitrate; however, this was not needed.

[5] Dr. Chris Littlewood is a musculoskeletal physiotherapist and a research follow at Sheffield University

1.3.2.3 Data extraction and management

The current review followed the same data extraction protocol used by Hoy et al. (3). The relevant study information was extracted (by TA) into a Microsoft Excel database. The extracted information included the following: region, country, year of publication, study type, sample size, case definition (anatomic/minimum episode duration/activity limitation), recall period, urbanicity, age, gender, prevalence and each item from the risk-of-bias tool (Table 1.3). Double entry of data was undertaken (by AA) for a randomly selected sample of studies (10 studies), and it indicated a high level of accuracy.

1.3.2.4 Assessment of the risk of bias

One reviewer (TA) assessed the risk of bias in each of the retrieved articles by using the same assessment tool developed and validated by Hoy *et al.* (103). The list included 10 items addressing four domains of bias, namely, selection, nonresponse, measurement and analysis bias (Table 1.3).

Table 1.3 Assessment tool for the risk of bias

Items	Low	Moderate	High
1- Was the study's target population a close representation of the national population in relation to relevant variables?			
2- Was the sampling frame a true or close representation of the target population?			
3- Was some form of random selection used to select the sample, OR was a census undertaken?			
4- Was the likelihood of nonresponse bias minimal?			
5- Were data collected directly from the subjects (as opposed to a proxy)?			
6- Was an acceptable case definition used in the study?			
7- Was the study instrument that measured the parameter of interest shown to have validity and reliability?			
8- Was the same mode of data collection used for all subjects?			
9- Was the length of the shortest prevalence period for the parameter of interest appropriate?			
10- Were the numerator(s) and denominator(s) for the parameter of interest appropriate?			
11- Summary item on the overall risk of study bias			

The response choices for each item were either high risk or low risk of bias. The tool also included a summary assessment indicator that evaluates the overall risk of study bias. The summary indicator was divided into three categories, namely, high risk of bias (scores 0–3), moderate risk of bias (scores 4–7) and low risk of bias (8–10). Hoy *et al.* (103) checked the validity and reliability of the assessment tool and indicated that it is reliable and valid to examine observational studies in the LBP field. A second reviewer (AA) assessed the risk of bias on a sample of eight studies (17%) to ensure that the criteria were applied consistently, and agreement could be reached. The overall level of agreement between

the two reviewers (TA and AA) was moderate (K = 0.69). Kappa statistics was calculated with SPSS® 22.

Differences relating to the interpretation of the criteria in the checklist were resolved through discussion. In the majority of instances, the initial assessment by TA was verified through a consensus. The quality of the overall evidence from the systematic review was summarised with the Grading of Recommendations Assessment, Development and Evaluations system (101), which has the following categories:

- High quality: Further research is very unlikely to change our confidence in the estimate.
- Moderate quality: Further research is likely to have an important impact on our confidence in the estimate and may change the estimate.
- Low quality: Further research is very likely to have an important impact on our confidence in the estimate and is likely to change the estimate.
- Very low quality: Any estimate is very uncertain.

1.3.2.5 Assessment of the impact of case definition on the LBP prevalence range

One of the important criteria in designing an observational study is the case definition because if different studies define LBP in different ways, reviewers may not be able to obtain accurate figures of prevalence across countries in a consistent manner (3,104). The case definition of LBP has two components, namely, topography and temporality. Topography refers to the anatomical location of the pain, and temporality refers to the recall period or episode duration (104).

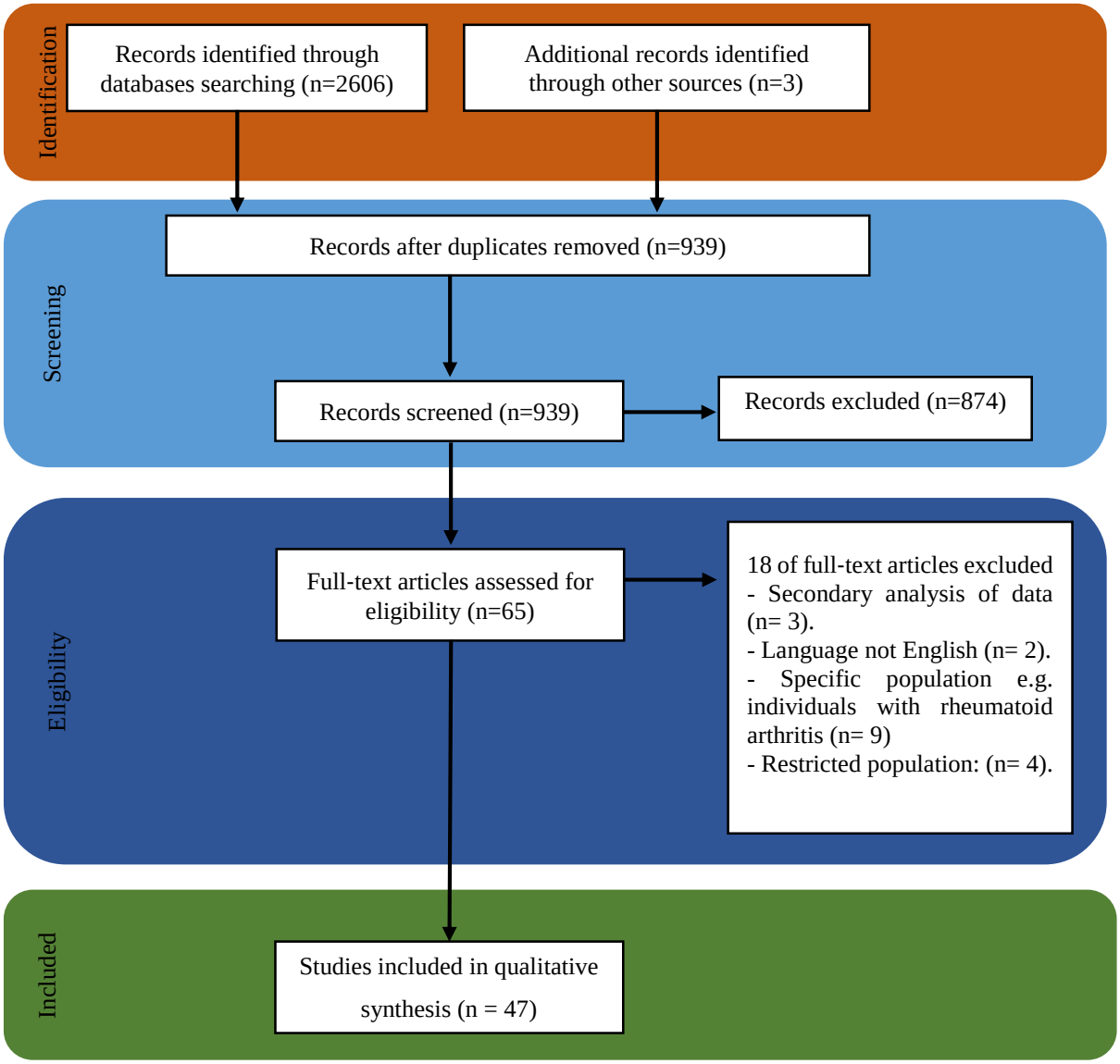
Hoy *et al.* (104) indicated that the majority of studies used three topographical categories, namely, back pain, LBP and pain in the area between the inferior margin of the 12th rib and the inferior gluteal fold (104). The category of back pain refers to any pain in the whole spinal segmental levels (cervical, thoracic, lumbar, sacral or coccyx). LBP might only include patients who have pain in the lumbar or sacral region, and this is more specific than the previous category. The last topographical category of LBP is more specific than back pain and LBP. Different recall periods were also used. Point prevalence, 1 month and 1 year are examples of the recall periods used.

1.3.2.6 Subgroup analysis

One reviewer (TA) conducted the subgroup analysis. Methodologic heterogeneity between observational studies in the field of LBP is well known (104) and has a clear impact on the ability to synthesise findings in the current review (105). Therefore, a narrative approach was undertaken to synthesise the findings on the environmental and

personal factors associated with the high prevalence of LBP. The prevalence estimates associated with different age groups, genders, marital statuses, educational levels, occupations, body weights, psychological factors and physical activities reported in the included studies were extracted and inserted in separate spreadsheets. These factors were determined prior to conducting the systematic review; new factors identified during data abstraction were added to the Excel database. Subgroup analysis was performed to examine the relationships between different environmental or personal factors and high LBP prevalence rates. The findings of this review were compared with those of the last systematic review of the global prevalence of LBP. Prevalence rates were combined according to the case definition and recall period.

Figure 1.2: Study selection process



1.3.3 Results

1.3.3.1 Prevalence of LBP

The initial systematic search returned 2606 articles published between January 2009 and April 2014 (Figure 1.2). Only 47 articles (Table 1.4) were included. The systematic search identified three studies that explored the one-year prevalence in Jordan. However, these were excluded because they reported the prevalence of LBP in a restricted population and not in the general population. This current systematic review suggests that the LBP point prevalence ranges from 25% to 47.7%, the one-year prevalence ranges from 7.9% to 49 % and the lifetime prevalence ranges from 7% to 83.4%.

The LBP recurrence rates over a one-year period in the current systematic review reported in this thesis ranged from 62.4% to 72% (35,106). The pattern of pain reporting over one year was relatively similar to the recurrence pattern. This result might also support the notion that individuals who have previous LBP episodes early on in their life are likely to continue to experience LBP in the future.

1.3.3.2 Quality of overall evidence

The majority of the studies (38 studies) were of a moderate quality, so the overall quality of evidence in the current review was considered moderate as well. This finding suggests that future research is likely to have an important impact on the level of confidence in the estimate and might change the estimate of LBP (103). Figure1.3 shows the different aspects related to the assessment of risk of bias. The findings suggested that the majority of studies included in the current review used less precise case definitions, long recall periods and invalid measurement instruments. These flaws might reduce the confidence in the reported prevalence rates and ultimately distort the current understanding of LBP.

Table 1.4: Prevalence of LBP around the world

No	Authors §	Country	Design	Anatomical definition	Recall period	Age group	Prevalence rates	Sample size	Attrition %	Risk of bias
1	Abegunde *et al.* (44)	Nigeria	Cross-sectional	LBP	3 months	60 to 110	40.16	630	1.56	Moderate
2	Akinpelu *et al.* (107)	Nigeria	Cross-sectional	LBP	1 year	≥18	47	1262	Not clear	Moderate
3	El-Sayed *et al.* (32)	Ethiopia	Cross-sectional	BP	1 week	Not clear	16.7	900	18	Moderate
4	Igumbor *et al.* (33)	South Africa	Cross-sectional	BP	1 year	≥18	38.27	473	4.6	Moderate
5	Miszkurka *et al.* (45)	Burkina Faso	Cross-sectional	BP	1 year	≥18	24 [21.5-26.6]	4822	2	Moderate
6	Baek *et al.* (26)	Korea	Cross-sectional	LBP	24 hours	≥65	72.6	714	36.14	Moderate
7	Biglarian *et al.* (108)	Iran	Cross-sectional	LBP	1 month	20-65	29.9 E	25307	Not clear	High
8	Bihari *et al.* (28)	India	Cross-sectional	LBP	24 hours	10 to 70	8.2	2086	10	Low
9	Cho *et al.* (109)	Korea	Cross-sectional	Area below the 12th rib and above the gluteal fold	Point 6 months Lifetime	40 to 79 (rural community)	Point: 33.4 [32-34.9] 6 months: 48 [46.5-49.5] Lifetime: 61.3 [59.8-62.7]	4181	10.2	Moderate
10	Choi *et al.* (34)	Korea	Cross-sectional	BP	1 year	≥18	19.5	1576	Not clear	Moderate
11	Chou *et al.* (110)	Taiwan	Cross-sectional	LBP	3 months	≥15	25.7	32,660	Not clear	Low

12	Davatchi *et al.* (111)	Iran	Cross-sectional	LBP	1 week	≥15	Dorsolumbar: 41.9	1565	13.73	Moderate
13	Fujii *et al.* (112)	Japan	Cross-sectional	Area below the 12th rib and above the gluteal fold	1 month Lifetime	20 to 79	1 month: 35.7 Lifetime: 83.4	65,496	Not clear	Moderate
14	Jackson *et al.* (113)	China	Cross-sectional	BP	6 months	Not clear	17.56	1003	67.04	High
15	Lu *et al.* (47)	Philippine	Cross-sectional	LBP	1 year	18 to 85	21	11,000	Not clear	Moderate
16	Ono *et al.* (27)	Japan	Cross-sectional	LBP	1 month	18 to 75	28.4	2,358	32.18	Low
17	Sandoughi *et al.* (50)	Iran	Cross-sectional	Area below the 12th rib and above the gluteal fold	1 week	≥15	28.83 [26.90 to 30.77]	2100	22.22	Moderate
18	Subramaniam *et al.* (114)	Singapore	Cross-sectional	BP	Life time	≥18	7	6616	24.1	Moderate
19	Teraguchi *et al.* (115)	Japan	Cross-sectional	LBP	1 month	21 to 97	43	975	39.33	High
20	van Oostrom *et al.* (39)	Netherland	Longitudinal cohort	LBP	1 year	1993-1997: : 25 to 65	1993-1997: 20.6 1998-2002: 18.1 2003-2007: 20.6	t1: 6118 t2: 4917 t3: 4520	48.42	Moderate
21	Wong *et al.* (116)	Hong Kong/ China	Cross-sectional	BP	3 months	≥18	28.5	5001	41.56	Moderate
22	Woo *et al.* (117)	Hong Kong/ China	Longitudinal cohort	BP	1 year	>65	48	4000	21.18	High
23	Yamada *et al.* (49)	Japan	Cross-sectional	Area below the 12th rib and above the gluteal fold	1 month	20 to 79	25.2	20044	0.09	Moderate
24	Yeo *et al.* (118)	Singapore	Cross-sectional	LBP	6 months	18 to 85	19	4141	56.4	Moderate
25	Yoshimura *et al.* (119)	Japan	Longitudinal cohort	BP	1 month	Not clear	37.7	9046	Not clear	High
26	Björnsdóttir *et al.* (51)	Iceland	Cross-sectional	CLBP	1 year	18 to 79	18	5756	39.7	Moderate

27	Fernández-de-las-Peñas *et al.* (35)	Spain	Cross-sectional	LBP	1 year	≥16	19.9	29,478	Not clear	Moderate
28	Fernndez-de-las-Pe~nas *et al.* (120)	Spain	Cross-sectional	LBP	1 year	≥16	7.9 [7.4–8.3]	22,188	Not clear	Moderate
29	Gerhardt *et al.* (121)	Germany	Cross-sectional	BP	3 months	18 to 74	17.73	2408	38.24	Moderate
30	Halla-aho *et al.* (122)	Finland	Cross-sectional	BP	2009: 2 weeks	2009: 75, 80, 85, 90, 95	2009: 18.1	2009: 1610	2009: 38.85	Moderate
31	Jiménez-Sánchez *et al.* (36)	Spain (Madrid)	Cross-sectional	LBP	1 year	≥16	22.6	12190	Not clear	Moderate
32	Klemenc-Ketiš *et al.* (53)	Slovenia	Cross-sectional	BP	1 month	20 to 80	42.58	937	Not clear	Moderate
33	Kolb *et al.* (106)	Switzerland								
34	Korovessis *et al.* (123)	Greece	Longitudinal cohort	BP	1 year	Not clear	1999: 33.2 2000:38.5 2001:37.4 2002: 38.0 2003: 37.0	3881	50.2	Moderate
35	Langley *et al.* (37)	Spain	Cross-sectional	Area below the 12th rib and above the gluteal fold	6 months	≥20	39.5	674	Not clear	Moderate
36	Leboeuf-Yde *et al.* (124)	Denmark	Cross-sectional	BP	1 month	≥18	60.53	5039	Not clear	Moderate
37	Neva *et al.* (125)	Finland	Cross-sectional	LBP	1 year	20 to 71	Lifetime: 57 1 year: 43	34,902	53.36	Moderate
38	Pedisic *et al.* (38)	Croatia	Cross-sectional	BP	1 year	21 to 64	25	1491	25.45	Moderate
39	Schmidt *et al.* (126)	Germany	Cross-sectional	BP	not clear	≥15	66.3	1030	Not clear	Moderate
40	Sterud *et al.* (127)	Norway	Cross-sectional	BP	3 months	18 to 75	63.7	8756	44.41	Moderate

41	Alkherayf *et al.* (128)	Canada	Longitudinal cohort	LBP	1 month	18 to 66	12.8	6745	32.81	Moderate
42	Freburger *et al.* (129)	USA (North Carolina)	Cross-sectional	LBP	6 months	20 to 59	20.91	73,507	44.71	Moderate
43	Johannes *et al.* (130)	USA	Cross-sectional	BP	3 months	≥21	10.16	837	84.38	High
44	Ohayon *et al.* (131)	USA California	Cross-sectional	CLBP	point	≥18	47.71	27,035	73.91	Moderate
45	Ferriera *et al.* (132)	Brazil	Cross-sectional	CBP	point	18 to 94	25	3243	14.36	Moderate
46	Meucci *et al.* (133)	Brazil	Cross-sectional	LBP	1 year	20 to 69	40	972	Not clear	Moderate
47	Peláez-Ballestas *et al.* (52)	MEXICO	Cross-sectional	Area below the 12th rib and above the gluteal fold	3 months	≥20	2002: 4.2 2010:9.6	2002: 3182 2010: 2732	t1: 5.6 t2: 10.4	Moderate

§ Studies were ordered according to continent and then arranged alphabetically according to the surname of the first author in each of these continents
BP: back pain; LBP: low back pain; p: prevalence
Risk of bias was examined with the assessment tool developed by Hoy et al. (103)
High = 0–3; Moderate = 4–7; Low = 8–10

1.3.3.3 Examining the impact of different case definitions on LBP estimates

This review involved inadequate studies to fully examine the impact of different case definitions on the LBP estimates. For example, only three studies in this review used the temporal parameter 'point prevalence', whereas only six used the topographical parameter 'pain in the area between the inferior margin of the 12th rib and the inferior gluteal fold'. This systematic review followed the same search strategy used in the last global review; therefore, combining the data extracted from the observational studies included in the previous review of Hoy *et al.* (3) with those retrieved by this current review is acceptable. Doing so gave the opportunity to extract different case definitions and prevalence rates from 212 studies (Table 1.5).

Figure 1.3: Assessment of risk of bias

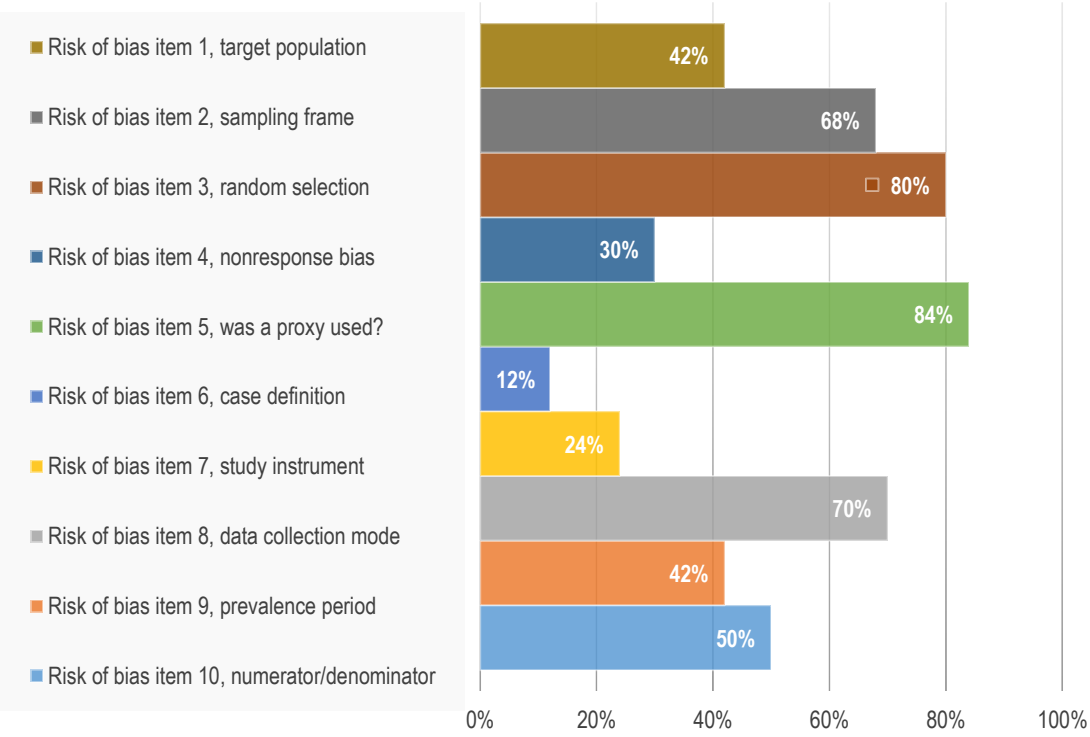


Table 1.5 shows that the range of LBP estimates tends to increase when researchers used a less precise case definition; however, this was not always the case with long prevalence periods (e.g. 3 months). This inconsistency might also be due to the small number of studies that used a particular case definition and recall period. For example, the range of LBP 'point' estimates increase with generic anatomical definitions, such as 'back pain'.

Table 1.5: Updating the last systematic review

Recall Period	Back pain (n=107)	LBP (n=151)	Area below the 12th rib and above gluteal fold (n=20)
Point (n=56)	M: 20.7 (n=23) R: [1.2-49.7]	M: 22.7 (n=30) R: [1.0-49]	M: 15.5 (n=3) R: [4.2-33.4]
1 week (n=26)	M: 26.6 (n=5) R: [8.1-35.7]	M: 16.3 (n=14) R: [5.1-41.9]	M: 15.9 (n=7) R: [5.5-28.83]
2 weeks (n=4)	M: 20.4 (n=2) R: [18.1-22.7]	M: 43.3 (n=2) R: [41.2-45.4]	M: N/A R: N/A
1 month (n=32)	M: 34.3 (n=12) R: [18.9-60.5]	M: 29.4 (n=18) R: [7.5-52.7]	M: 30.5 (n=2) R: [25.2-35.7]
3 months (n=15)	M: 34 (n=6) R: [10.2-63.7]	M: 35.7 (n=7) R: [24.1-52.1]	M: 6.9 (n=2) R: [4.2-9.6]
6 months (n=13)	M: 39.7 (n=5) R: [17.6-59.7]	M: 45 (n=6) R: [15.6-71.4]	M: 43.8 (n=2) R: [39.5-48]
1-year (n=89)	M: 32.9 (n=42) R: [8.9-76]	M: 37.9 (n=44) R: [7-72.4]	M: 20.9 (n=3) R: [11.6-28.2]
Lifetime (n=45)	M: 43.7 (n=12) R: [3.9-85.5]	M: 42.4 (n=30) R: [1.6-84]	M: 52.1 (n=3) R: [1.6-83.4]

n is the number of estimates, M is the mean and R is the range.

With regard to the influence of different recall periods on LBP estimates, this review cannot identify a clear and consistent pattern that suggests an association between long recall periods and a wide range of LBP estimates. For example, the lifetime LBP prevalence range was similar across different case definitions. This result might be due to selection, recall and measurement biases, which can indicate that the identification of a specific anatomical area within the case definition is important (3).

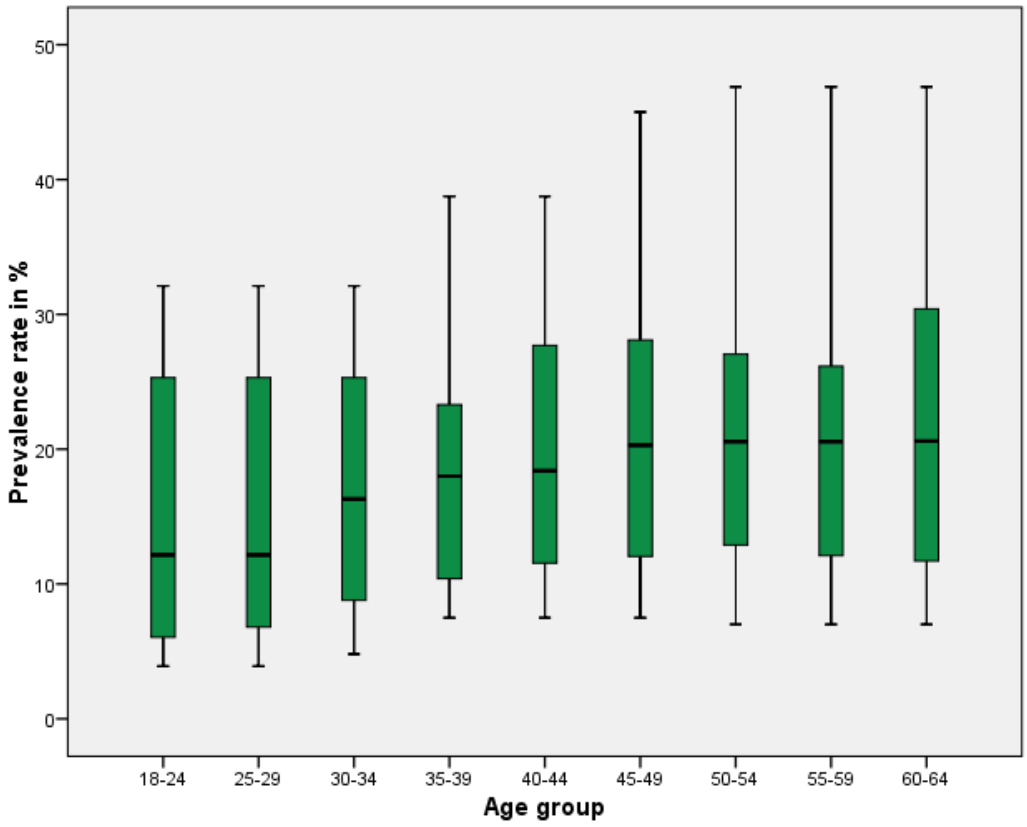
1.3.3.4 Subgroup analysis of the personal and environmental factors associated with high prevalence rates

Exploring the global prevalence of LBP in this review with the use of different populations and settings, as well as within the context of different countries, enabled the current review to examine the association between some of the environmental and personal factors and the high prevalence of LBP. Despite the methodologic heterogeneity between the studies included in the current review, this review combined only the prevalence rates of studies that used the same case definition and recall periods. It reviewed some of these factors associated with high prevalence rates, such as age, gender, educational level, body mass index and physical activity.

1.3.3.4.1 Age

Figure 1.4 shows the median prevalence of LBP according to age group. The evidence in the current systematic review with regard to the idea that LBP is prevalent in old age is conflicting. In this review, 10 studies suggest that age is one of these factors, whereas the overall LBP prevalence continues to increase with age until the mid-60s and then slowly declines (34,51,53,110,114,123,127,133-135). On the other hand, five studies reported that the LBP prevalence rates are relatively similar across different age groups (49,116,128,130,132).

Figure 1.4: Median prevalence of LBP, with interquartile range, according to age group



1.3.3.4.2 Gender

Table 1.6 shows the LBP prevalence according to gender. In this paper, 24 studies indicated that LBP is more prevalent in females than in males (26,28,32,34,35,38,39,50-53,106,108-110,112,115,121,123,125,127,129,132,133). Furthermore, one study reported that women are more likely to develop chronic LBP or take sick leaves as a result of LBP (116). However, four studies in this review reported no significant differences in prevalence between genders (114,120,128,130).

Table 1.6: Comparison of the prevalence of LBP according to gender

Recall period	Gender	Anatomical location of pain		
		Back pain	Low back pain	R12 to lower GF§
Point prevalence	Male	-	-	23.8
	Female	-	-	41.2
1 day	Male	-	32.2	-
	Female	-	46.4	-
1 week	Male	37.4	-	18.9
	Female	62.6	-	39
1 month	Male	35.2	19.2	43.3
	Female	40.6	26.8	42.6
3 months	Male	20.3	21.5	4.8
	Female	22.4	30	8.5
6 months	Male	-	-	36.4
	Female	-	-	49.1
1 year	Male	14.7	21.5	-
	Female	23.2	29.2	-
Lifetime	Male	7.2	-	68.1
	Female	6.8	-	75.9

1.3.3.4.3 Marital status

Ten studies indicated that unmarried individuals reported significantly less LBP than their married, divorced and widowed counterparts (35,36,51,108,110,114,120,121,123,132).

1.3.3.4.4 Place of residence

Conflicting evidence exists with regard to the place of residence as one of the environmental factors that influence the development of LBP. Four studies indicated that individuals who are living in rural areas are likely to complain more about LBP than those who live in urban areas (50,107,108,123). Only one study (51) found no difference in LBP prevalence between different residence places. However, two studies (44,111) indicated that LBP is more prevalent in urban areas than in rural ones.

1.3.3.4.5 Educational level

People with high educational level (e.g. university degree) were reported in 14 studies to have a lower prevalence of LBP than those with low educational level (e.g. school education) (34-36,51,108,110,114,120,121,123,127,129,133,136).

1.3.3.4.6 Occupation

Six studies indicated that individuals who are unemployed or retired reported higher LBP prevalence rates than do white-collar workers (35,51,110,114,120,129). Two studies indicated that blue-collar workers complain about LBP more than do white-collar workers (34,127).

1.3.3.4.7 Body weight

Ten studies included in the updated review indicated that overweight and obesity are associated with increased prevalence of LBP (34-36,51,108,110,120,128,132,133).

1.3.3.4.8 Physical activity

Six studies in this review indicated that those individuals who are physically active reported a less significant LBP compared with those who live a sedentary lifestyle (34,35,40,110,120,128).

1.3.4 Discussion

The findings of this review suggested that LBP continues to be a major problem throughout the world and is most common among females and people aged 40–65 years old, do manual work, have a high body mass index and have low levels of education or physical activities. The current updated review indicated that the majority of the studies used a vague case definition. Furthermore, nearly two-third of the studies were at risk of recall bias, and 76% of the studies did not use a valid and reliable measurement tool, so the risk of measurement bias was increased. The findings of this review were similar to those of the last systematic review of the global prevalence of LBP (3).

The findings of the current review suggested that LBP prevalence continues to increase with age until the mid-60s, and then it decreases. The prevalence values for people over 60 years might have been missed because of under-reporting, or perhaps individuals already suffer from other comorbidities, such as osteoporosis or hip fracture, which may affect their lives more than LBP does (137).

Many recent international studies indicated that LBP is a long-term or lifelong condition (3,4,41,138) and that the study of pain should be over the course of one's life and not at an individual point in time. These studies argue that LBP is highly prevalent in adolescents and in children. This result can mean that individuals who are affected by

LBP at a young age will continue to have episodes of LBP throughout their whole life. Therefore, LBP is considered a recurrent condition, such as asthma, which has episodes of exacerbations and remissions (4,41,55).

The study of the trajectory of LBP is important to the development of an outcome measure in this thesis because compared with other chronic health conditions, such as chronic obstructive pulmonary disease, the clinical course of LBP fluctuates over time, and consequently, the measurement of LBP should be over time and not at an individual point in time. This review also suggests that LBP outcome measures should possess the ability to reflect three patterns of changes, namely, improvements, deteriorations or lack of change. These patterns of changes were reported in a recent study by Leboeuf-Yde *et al.* (138), who examined the absence of LBP in the general population over one year. The participants received an automated text (SMS) message every two weeks. They were asked to report their number of days with LBP in the preceding fortnight. Approximately 11% of the respondents reported continuous LBP over a period of one year, 83% had at least one month without LBP and 52% reported two months' interval without feeling LBP.

1.3.4.1 Comparison between the Jordanian studies and the international studies

The systematic search showed that no studies investigated the prevalence of LBP in the general population in Jordan; however, a number of institutionalised studies that describe the prevalence of LBP were identified in the literature. These studies have a moderate (92,93) to high risk of bias (94). The cross-sectional studies conducted in Jordan found that the LBP prevalence ranges from 56% to 81%.

Such discrepancies between international studies and those in Jordan may be attributed to the different research methods used or may be caused by the specific nature of the Jordanian society, which certainly differs from those of other cultures. Reporting pain for Muslims, for example, is somewhat related to the acceptance of the idea that pain is from *Allah* (the creator), and it is a test of human patience (95). Reporting pain for males may be culturally unacceptable in Jordan and may be considered a sign of weakness, and this may be the cause behind the low figures of reporting pain among males (95). Taking into consideration culture and ethnicity may be of great importance to identify what is important to measure in people with LBP. The same issue was reported in a study that used the Oswestry Disability Index; in this research, the majority of Japanese females

who were suffering from LBP did not answer questions related to their sexual activities because of cultural reasons (139,140).

The Jordanian studies and the international ones had similarities and differences in the methods they used. Jordanian authors used the international case definition of LBP. Doing so helped in pooling findings from different studies to draw the Jordanian profile compared with that of the international community. All Jordanian studies selected the cross-sectional method as the most convenient and pragmatic method to overcome the high cost and dropout rate encountered in the conduct of longitudinal prospective cohort studies.

Arguably, the findings of the Jordanian studies may have been affected by *recall biases* because the participants were asked to remember if they suffered from LBP within the past year. Other studies limited the recall period to one month to control recall biases and hence increase confidence in the accuracy of their findings. Moreover, the random sampling methods employed by the non-Jordanian studies can increase external validity and aid generalisability.

Finally, a critical comparison between the instruments used indicated that the non-Jordanian studies might have been able to target the specific domains relevant to LBP by using condition-specific tools rather than less pertinent generic tools, such as the Middlesex hospital questionnaire (141).

The current systematic review showed a gap in the literature. The findings of the review suggested the lack of valid measurement tools in Jordan, specifically within the LBP field, and this finding supports the aim of this thesis to design a suitable outcome measure to be used within the Jordanian healthcare system. Furthermore, the review showed that LBP is a widespread and common problem, so the development of valid and reliable outcome measures might help evaluate and develop current treatment strategies in the Jordanian context.

1.3.4.2 Limitations

This review has a number of limitations. Firstly, only studies written in English were included, so the risk of excluding important studies existed. However, the author of this thesis only identified one study (142) written in the French language. Secondly, the majority of this work was conducted by one reviewer only. This might introduce the

possibility of reviewer bias (143). However, there is a trend in the field of systematic review methodology headed for an appreciation of rapid reviews. Commonly such reviews utilise one reviewer at the various stages for pragmatic reasons and despite the acknowledgment that the potential error is higher, it is generally proposed that most errors or omission do not lead to significant change in any conclusion (144).

1.3.5 Conclusion

This review supports the findings of the previous global review of Hoy *et al.*(3). This systematic review is important to this thesis because it showed that old age, being a female, being married, doing manual work, being obese and having a low level of education were some of the factors that might be associated with high LBP prevalence rates. This review encourages future epidemiological studies to use precise case definitions, short recall periods and valid and reliable measurement tools suitable to be used on individuals with LBP to enhance the overall quality of the research design. This chapter has identified the knowledge underpinning the condition, and it indicates that the measurement of change in individuals with LBP should be over time and not at an individual point in time. The next chapter reviewed the impact of LBP on individuals' quality of life.

Chapter 2: Impact of LBP on individuals' quality of life

Key point in Chapter 2:

- The pain experience is multidimensional, so many aspects of individuals' quality of life are affected by LBP. LBP might cause many limitations in people's activity levels, which consequently have an impact on their physical, social, emotional and cognitive functioning. This chapter provides an in-depth understanding of the impact of LBP on the different dimensions of individuals' quality of life. However, no studies have been conducted in Jordan to explore the impact of LBP on Jordanian individuals. This chapter demonstrated the need to undertake a qualitative study to explore the perspective of Jordanian individuals with LBP about the impact of this condition on their life.

2.1 Introduction

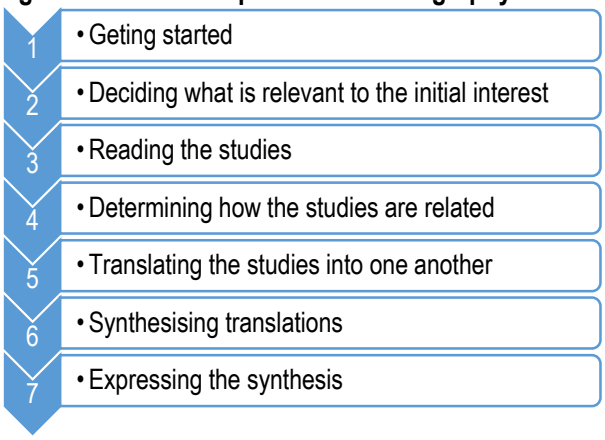
The systematic review in the previous chapter showed that LBP affects societies regardless of geographical location; however, exploring the impact of LBP on individuals' quality of life is equally important in this thesis. Currently, what the impact of LBP is on Jordanian individuals is unclear. Therefore, another scoping review of the healthcare literature was needed to identify any study that investigated the impact of LBP on the quality of life of Jordanians. Doing so is important to identify the dimensions of quality of life that are affected by LBP and determine later on in this research programme whether the current LBP outcome measures address these affected dimensions. The following section aims to explore the experience of living with non-specific LBP at the individual level.

2.2 Meta-synthesis study of qualitative papers that investigated the impact of LBP on individuals' lives

Froud *et al.* (5) conducted a recent meta-synthesis of qualitative studies that investigated the impact of LBP on people's lives. The authors searched different databases to identify studies that explore people's experiences of living with non-specific LBP. The authors took into consideration that qualitative research can be one part in a clinical trial; therefore, they also searched the PEDro database for nested qualitative studies within clinical trials. Meta-ethnographic and meta-synthesis approaches were used to thematically code abstracted data. These methods were used to identify concepts from different individual studies to synthesise a whole picture on the impact of LBP on people's lives. Furthermore, these methods helped develop a comparative understanding of LBP (145). Froud *et al.* (5) modified a meta-ethnographic approach developed by

Britten *et al.* (146) for qualitative data synthesis (Figure 2.1). Terms developed from the Cochrane back review search strategy, scoping search and team discussions were used (147). The search strategy was well illustrated, and it can help replicate and trace the search process (98).

Figure 2.1: Seven steps of meta-ethnography



Cited in Britten et al. (146)

2.3 Findings

A scoping search of the literature identified no studies conducted in Jordan on the impact of LBP on individuals' life. This research programme responded to this gap in health services research by conducting a qualitative study in the development of the measurement tool phase to explore the perspective of Jordanian individuals with LBP about the impact of this condition on their life. The findings reported in this chapter were compared with those of Jordanian qualitative studies [Chapter 9]. Doing so enabled identifying the similarities and differences between the themes generated in the Jordanian studies and those reported in this chapter.

The systematic searched identified 49 articles describing 42 original studies. Five themes were identified from participant-level data. These major themes in the meta-analysis study were activities, relationships, work, stigma and changing outlook (5). LBP seems to negatively affect individuals' ability to perform activities of daily living because of impairment associated with the condition.

> *"Things like [cleaning the] bathroom and shower and stuff, because you have to get right in and you're bending over when you're scrubbing." (Angela, 35, cited in (5))*

This loss of function also undermined family's activities, which seemed to affect relationships, especially with those closest to the individual with LBP. People with LBP also described a paradoxical need for support from those closest to them, but at the same time, they avoided social interactions because of intense episodes of LBP.

"…we won't go anywhere now because of that [being boring with little to talk about except pain]. I get too embarrassed and I just hate being in company and you always get onto that subject [pain]. And if you're out for a social evening the last thing people want to hear is what your misery, so I just, that's why we don't go out often." (Becky, cited in (5))

Sufferers isolate themselves from those closest to them to avoid spoiling the experiences of their loved ones. This loss of functional ability might lead to feelings of isolation, dependence, cohabitation difficulties and issues involving sexual relationships.

"I don't go out, I don't answer the phone, I live at the back of the house and I dread it when the postman comes. … I don't know what to say, or anything, I just feel embarrassed. You just think 'what do they think of me?" (Kevin, cited in (5))

Individuals with LBP described how they modified their work tasks to avoid losing their jobs and facilitate function. Allowing some time to recover was one example of these modifications.

"I don't look sick, I don't limp, I don't have a cane, I'm not in a wheelchair, I don't look terrible … I look good. So [the people I work with] could have the perception that she's not really sick, she's just taking days off" (Participant 14, cited in (5))

Different age groups reacted differently to the presence of LBP. For example, young individuals worried most about loss of employment because of LBP. They perceived LBP as a threat to their career, whereas older people who were closer to retirement seemed to find asking for help easier.

"I can't go off-sick. I can't afford to go on half-pay [incapacity]. So … so that's a real dilemma and then I think: God, I have to work until I'm 65! I've got a mortgage to pay. How am I going to cope? … You start thinking: what if it never goes, right? What if it gets worse? What am I going to do?" (Anon, cited in (5))
"If I am having a bad day they're [the clients] perfectly happy just for me to sit there and have a cup of tea with them and keep them company . . . I make it up to them . . . On a good day I'll flip the damn mattress, but on a bad day I am sitting!" [Female, 57 years old, home aide for the elderly (148)].

Individuals with LBP also described how they forced themselves to engage in activities they thought would likely exacerbate their symptoms simply to maintain social relationships or perform tasks at their work despite their pain. Their participation in social events, the performance of certain activities at work and the lack of acceptable diagnosis might undermine the credibility, legitimacy and validity of their LBP. This situation might include not being believed by family, friends, co-workers, employers and healthcare providers.

"I remember at my sickness interview - you can see the disbelief in the manager's eyes, and I'm thinking OK well …" (male, aged 37, cited in (5))

Some individuals with non-specific LBP managed to adapt to and cope with LBP. Others who received a diagnosis for their LBP seemed empowered and accepting of their problem, especially if the diagnosis was in the form of radiographic evidence.

"I got quite a lot of sympathy from any medical profession because I had an X-Ray and it could show the damage, and I certainly...in the rehab programs that I was involved in there were a lot of people with non-specific lower back pain who were...who felt angry at the world, and angry at the system, and angry at the health professionals, and I really believe that because I had really obviously hurt my back that I did in some ways have it easier." Lynne, cited in (149))

However, some patients doubted the validity of their diagnosis. Individuals with LBP expressed their anger, frustration and depression if they received a second diagnosis that contradicted their initial diagnosis, especially, if the initial diagnosis implied a psychosomatic origin.

"the doctors say oh, it's stress or it's anxiety and they (put) you on anti-depressants. Then you get the surgeons who only look at one line and that's to cut and they won't give you an option of massage or physiotherapy". Marjorie, cited in (149))

Individuals with LBP described different psychological and emotional statuses, including experiencing anxiety, hopelessness, shame, embarrassment, fear of pathology, fear of movement, feeling imprisoned, determination, identity threats and uselessness.

"I mean, I've had days and weeks where I've just got depressed over it, and I think, well, I can't be bothered, there's no point, it's not getting better… I felt like a wasp with a very tiny waist. Just imagine! Such a waist may snap anytime! It was horrible, I just couldn't move! I didn't think I'd make it." (Anon, cited in (5)).

2.4 Summary

This chapter identified a significant lack of knowledge of the impact of LBP on Jordanian individuals. Whether this impact on Jordanians is different from that experienced by other nationalities is also unclear. This research programme identified this gap in the healthcare literature, and a qualitative study was needed to explore the perspective of living with LBP [Chapter 9]. Even if LBP is not a life-threatening condition (104,150), it does affect individuals' quality of life (5). Because of the inability to identify a cause in the majority of cases diagnosed with non-specific LBP, healthcare professionals are shifting their focus from identifying the cause of LBP to examining the impact of LBP on people's life (5,55). This initiative has resulted in a movement away from a biomedical model to a bio-psychosocial one for the management of LBP. An understanding of the management models of LBP is important in this thesis because these models form the theoretical basis of current physiotherapy practice. Biomedical and biopsychosocial models are therefore reviewed in the next chapter.

Chapter 3: LBP Management models

Key points in Chapter 3:

- The bio-psychosocial model is considered the appropriate model for the management of LBP. This model seems to address the different dimensions related to the impact of LBP on people's life.

- The WHO used the bio-psychosocial model to develop the International Classification of Function, Disability and Health (ICF). The ICF was developed as a universal framework to help healthcare professionals understand complex conditions, including LBP.

- The WHO encourages healthcare systems to use a new integrated healthcare model that places patients at the centre of healthcare.

3.1 Introduction

The previous chapters identified the knowledge underpinning LBP. LBP is a chronic and costly condition leading to functional limitations that follow a fluctuating trajectory. These limitations in physical functioning affect other dimensions of individuals' quality of life, such as mental and social functioning. They also sometimes create complex cases requiring multidimensional interventions (6). This chapter aims to identify the knowledge underpinning these complex interventions used in the management of LBP and the contribution of physiotherapy to the integrated care[6] of individuals with LBP. This goal is important to improve the understanding on the potential outcomes of the management approaches in musculoskeletal physiotherapy and how these outcomes should be measured (152).

Management models have the potential to influence the way health professionals evaluate and look after patients. Glanz *et al.* (153), p. 26, suggested that, "*Health behaviour and the guiding concepts for influencing it are far too complex to be explained by a single, unified theory. Models draw on a number of theories to help understand a specific problem in a particular setting or context. They are often informed by more than one theory, as well as by empirical findings*". The following subsections aim to assess the importance, strengths and weaknesses inherent in the selection of the biomedical or bio-psychosocial models in the management of LBP. Both models were selected because they are two of the most commonly used approaches in spine care (6,154).

[6] The WHO defines integrated care as 'a concept bringing together inputs, delivery, management, and organization of services related to diagnosis, treatment, care, rehabilitation, and health promotion' (151), p. 7.

3.2 The biomedical model (also known as the disease model)

Texts that describe the use of the biomedical model of illness within Western healthcare pre-date the 19th century (155,156). Prior to the development of the biopsychosocial model in the late 1970s, the majority of clinicians assumed that pain was the consequence of a pathological process in the bones, joints, muscles, nerves or connective tissues (157). The biomedical model assumes that tissue pathology is directly proportionate to the level of pain and disability (158). The model strictly looks at patients' current condition from pathoanatomic or pathophysiologic perspectives and does not recognise the importance of psychological, environmental and social influences (154,159,160). In the biomedical model, disease can be conceived outside of its embodiment in certain patients and is envisioned as an entity unto itself (154). This argument mean that the disease itself can be studied independently, with the goal of developing chemical treatments to stop, reverse or prevent the pathological process or using mechanical treatment that reconstructs or excises the affected structure.

The objective study of the underlying pathoanatomy and pathophysiology has significantly improved the medical profession (154). However, regardless of the success in the treatment of many illnesses, some complex and important health conditions have proven resistance to the biomedical approach. The biomedical model indicates that health is the absence of pain, illness or defect. In this model, any illness has an underlying cause, and once that cause is eliminated, the patient will be cured and become healthy again (6). The assumptions of the biomedical model were found inadequate in the management of many conditions, such as non-specific LBP, which has an unclear cause and psychological and social implications that might affect the outcomes of treatment (154,161).

Conditions, such as non-specific LBP, are important because they are common and costly. However, the link between clinical assessment, pathological diagnosis, treatment and outcomes is lacking. Some issues relating to the management of LBP using the biomedical model exist. Firstly, LBP is a self-limiting condition, and people can deal with it themselves most of the time, so this symptom can be regarded as a subjective health complaint rather than a serious tissue injury (104). In addition, because of current limitations in knowledge, healthcare providers cannot identify any affected anatomical structures most of the time (>80%) (56).

Secondly, the biomedical model explains pain as a tissue injury. This model does not consider all the factors that have an impact on people's quality of life. Biological factors, as well as psychological and social factors, should all be considered when a diagnosis is made. For example, Carragee (162) suggested that persistent LBP develops frequently in patients who, at the time of initial assessment, have a high level of fear avoidance, psychological distress, disputed compensation claims and job dissatisfaction. Excluding these psychosocial factors when planning spine care correlates strongly with treatment failure (163). Hence, the complexity and multidimensional nature of LBP does not lend itself to the reductionist approach of the biomedical model.

Thirdly, this model fails to explain many clinical observations, such as asymptomatic patients with disc prolapse (56). Patients who complain of symptoms that have no clear cause might be dismissed as not being ill despite the impact of their symptoms on their daily life (158).

Finally, as concluded from the previous chapters in this thesis (epidemiology, pathology and natural history of LBP), people clearly react differently to the back pain experience; the way patients think and feel have an influence on their disability, pain, illness behaviour and clinical progress (161). Social, environmental and contextual issues considerably affect disability and illness behaviour (60,72). Individuals with LBP will react and modify their behaviour and beliefs according to the surrounding socio-cultural environment (164). These issues highlight the limitations of the biomedical model and have led to the development of the biopsychosocial model of illness. The biopsychosocial model does not only address psychological and biomedical factors but also suggests that social factors, such as relationships and role in society, play an important role in the management of patients with LBP (104,165).

3.3 The biopsychosocial model

The biopsychosocial model is considered an advancement of the biomedical model (154). Over recent years, the pathoanatomic and pathophysiologic grounded 'disease' within the biomedical model has shifted to the contextual grounded 'disorder' within the biopsychosocial model. This shift was significant because of its impact on the ways clinicians evaluate outcomes and the ways these measured outcomes have been utilised to guide patient care (154).

The biopsychosocial model has received widespread recognition within the spine care community, and its implementation has an important impact on the ways in which physiotherapy services are delivered and measured (154,166). Compared with the biomedical model, the biopsychosocial model suggests that patients' unique biological, psychological and social factors must carry equal weight at the time of evaluation. Presentations, such as spinal pain, disability, capability to return to work, patient satisfaction, and spine biomechanics, can only be understood and examined through this model (167).

Figure 3.1 suggests that management models affect the level of measurement and the implementation of different measurement tools within spine care. The theory of measuring scale and scaling methods were discussed in detail in Section 2 in the conceptualisation of the problems phase. Figure 3.1 suggests that the biomedical model is pointing to an underlying pathoanatomy or pathophysiology in isolation of psychosocial factors. Diagnostic radiological imaging, blood tests and range of motion measures are a few examples of pathoanatomic measurement tools developed according to the biomedical model. On the other hand, the biopsychosocial model recognises the different dimensions that are affected by LBP. This understanding has led to the development of many patient-oriented outcome measures, such as pain scales and back-disability scales. Many key elements are built in the biopsychosocial model (158). Table 3.1 identifies these elements and the factors that influence them.

Figure 3.1: Use of different management models to determine the use of different outcome measures.

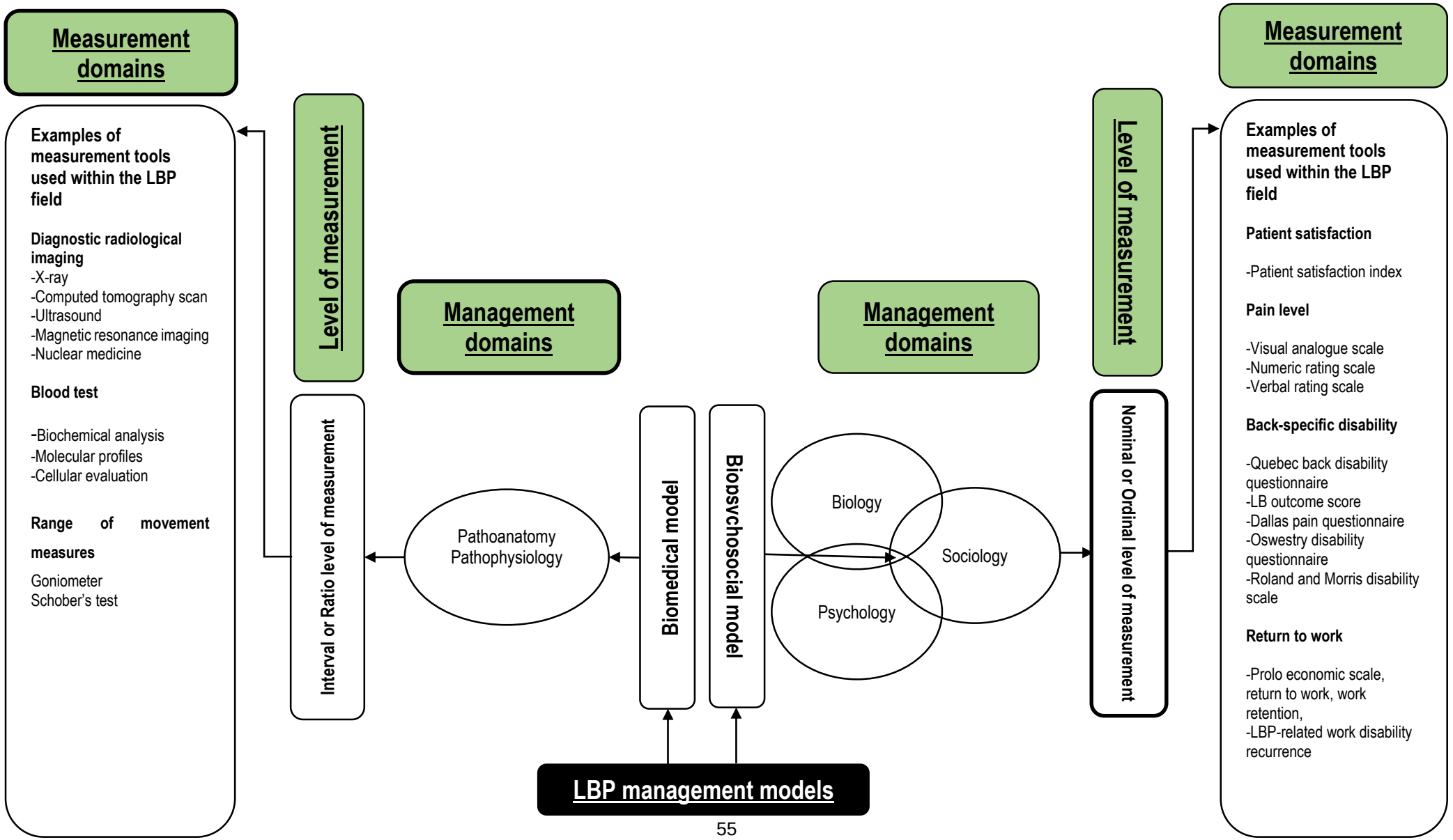


Table 3.1: Clinical elements of the biopsychosocial model

Components	Depend on	Causes		
Physical dysfunction	Dysfunction relies on a number of factors; the degree of stress and the demand required, with the ability of the musculoskeletal system to create balance between both forces. It is said that if a functional disturbance has caused back pain then there is always a hope for potential recovery.	Might occur in structurally normal tissues		
		A primary dysfunction arising in response to abnormal forces imposed on or generated within the musculoskeletal system		
		Abnormal patterns of muscle function, abnormal forces acting on musculoskeletal structures, abnormal posture or abnormal joint movement may all produce pain		
		Segmental soft tissue changes; neurophysiologic and psychophysiologic changes		
Beliefs and coping	Expecting pain with much anxiety and attention. The understanding of pain influences of previous experiences in addition to the power of suggestion or placebos. Such beliefs can partially represent the backs' actual condition, and rather show what individuals perceive of their back conditions	*Beliefs*	Beliefs about damage and disease	
			Fear of hurt and harming	
			Fear-avoidance beliefs	
			Personal responsibility, control, and self-efficacy	
			Beliefs and expectations about treatment	
		Coping	Active or passive	
			Catastrophising	
			Beliefs affect healthcare: healthcare affect beliefs	
Distress	Pain is often associated with a psychological state of arousal and distress, which sensitizes the body to pain intensity and lowers the pain threshold and tolerance. Thus, LBP patients become preoccupied with their back problems and seek medical help.	Anxiety		
		Increased bodily awareness		
		Fear and uncertainty		
		Depressive symptoms		
		Anger and hostility		
Illness behaviour	Patient's attitudes towards pain reflect their emotional processing rather than the causative problem. These attitudes are influenced by personal beliefs around pain, and individual coping or management skills.	Observations of illness behaviour:		
		Pain drawing	Help with personal care	
		Pain adjectives and description	Non-anatomic or behavioural description of symptoms	
		Overt of pain behaviour	Non-organic or behavioural responses to examination	
		Down-time	Use of walking aids	
Social interaction	The effects of family, vocational, social lives on influence beliefs and coping skills cannot be denied.	Family	Litigation	Social class/occupation/ education
		Culture	Unemployment	Job satisfaction and psychological aspects of work
		Social security	Early retirement	Workers' compensation

Adopted and modified form Waddell (161)

A growing concern with the biopsychosocial model represents its scientific status as a key element for scientific theories, with the ability to test and falsify it (168,169). The biomedical model might suggest that tissue injury in the spine is the primary cause of LBP; this can be tested scientifically (falsified) and rejected by the medical scientific community. Whether the biopsychosocial model can allow such an empirical testing is unclear because of the complex and multidimensional nature involved in this model. In this stage, recognising the complex synthesis of biological, psychological, cognitive and social factors, which might lead to different 'kinds' of possibilities, is important; understanding the effect of each of these factors on the current condition, i.e. 'which component will affect the patient and when?' (154), poses a challenge. This issue might be highlighted by the fact that philosophers spent more than a millennia exploring the relationship between the mind and body (170,171).

Despite these limitations in the biopsychosocial model, its implementation within spine care is clear. The WHO designed the ICF according to the conceptual framework in the biopsychosocial model of illness (172). This classification will be discussed in detail in the following subsection.

3.3.1 The International Classification of Function, Disability and Health (ICF)

The ICF was reviewed in this thesis for two main reasons. Firstly, the ICF provides a current, comprehensive model of standardised assessment of functioning and disability. Secondly, the ICF can be used as a guideline or reference for the development of standardised measurement tools under a framework that integrates the biological, medical and social models of healthcare (173,174). Understanding the relationship between LBP outcome measure and the ICF is therefore important. Therapists can better understand and examine the content of current LBP outcome measures by referencing them to ICF categorised standards. This thesis has compared the content of existing LBP outcome measures, the findings of the qualitative study [Chapter 9] and the TELER LBP indicators [Chapter 12] with the ICF LBP core set (175). This step was important to determine whether such content is comparable to the ICF categories.

After an extensive global examination involving individuals with various kinds of disabilities, as well as healthcare professionals from various disciplines, in 2001, the World Health Assembly approved the ICF for use (176). The biopsychosocial model formed the basis of the development of ICF categories (177), especially for creating

specific sets of core categories for health conditions, such as LBP (175). The ICF represents a conceptual framework and classification system that organises and describes information related to functioning and disability. The framework was designed to provide a universal standard language and conceptual basis for the definition and measurement of health through the examination of functioning and disability.

The WHO integrated the major models of disability to develop this classification of functioning. The ICF successfully placed all health conditions on an equal footing by shifting the focus from health conditions to functioning (178).

One of the important characteristics of the ICF is the neutrality of language used. Domain definitions are worded in neutral language to allow the recording of both positive and negative aspects of functioning and disability. The classification system is therefore suitable for all individuals whether they have disability or not. This feature also helps prevent the stigma induced by some health problems. This characteristic is particularly relevant to individuals with LBP in which the stigma of the self-inflected disease and avoidance behaviour are two of the main factors that limit participation (5). Another characteristic is that the ICF reflects on individuality by recognising the role of environmental factors that affect functioning, as well as associated health conditions and their effect on people's quality of life. Environmental factors range from physical factors, such as building design and climate, to social factors, such as laws and institutions.

The ICF is a multidimensional classification system developed to serve different disciplines and sectors across various countries and cultures; therefore, it helps enhance communication among different users, such as individuals with disabilities, health professionals, researchers and policymakers (176). The standard language in this classification system also facilitates and enhances data comparison across healthcare disciplines, time and countries. Therefore, the ICF is directly relevant to this thesis.

3.3.1.1 Component of the ICF

The classification system has two parts (176). Part 1 represents functioning and disability, and part 2 represents contextual factors. Each part has two components (Figure 3.2).

Figure 3.2: Components of the ICF

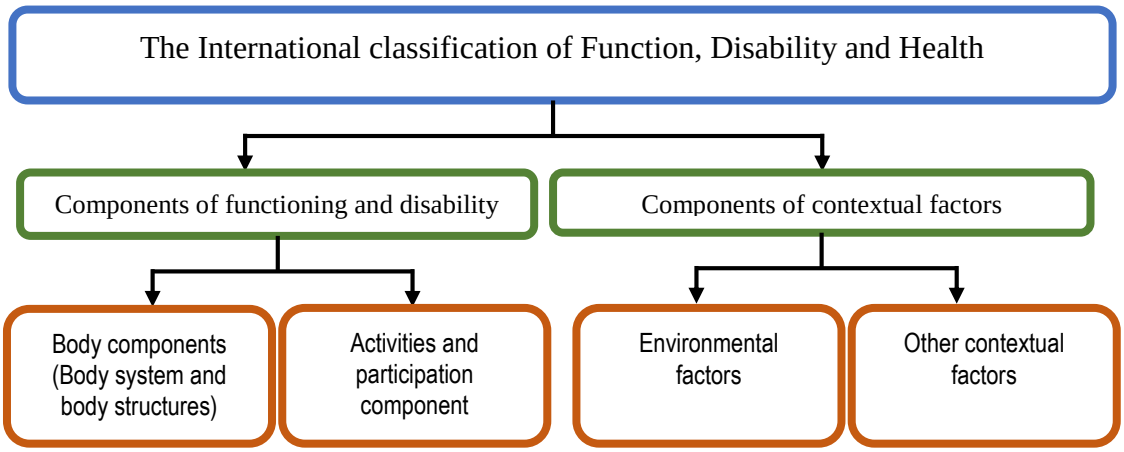
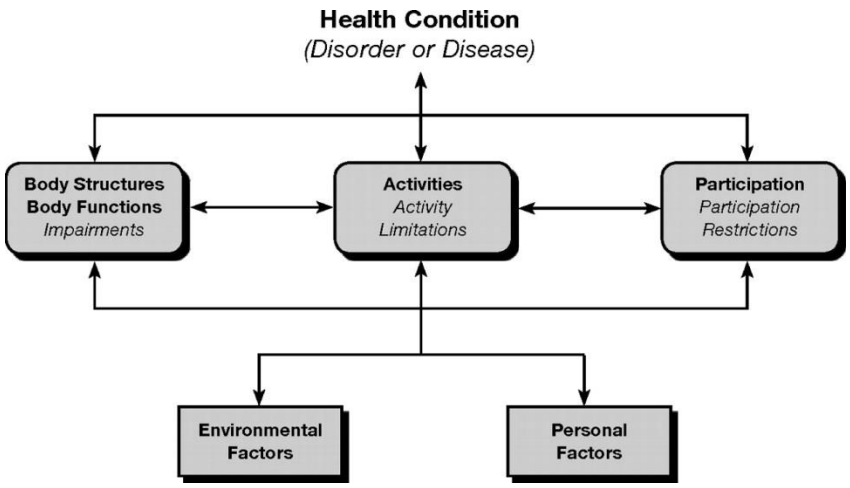


Figure 3.3 shows the dynamic interaction between all ICF components. The components of functioning and disability indicate the presence or absence of health problems, such as impairments, activity limitations and participation restrictions. This characteristic of the ICF enables identification of the aspects of functioning influenced by health problems. Doing so is important in conditions, such as LBP, which simultaneously affect different dimensions of people's quality of life (5).

In the ICF classification system, each component contains hierarchically ordered domains; these are sets of related physiological functions, anatomical structures, activities and external influences. The ICF provides a classification of functioning for each individual regardless of whether this individual is suffering from a health condition or not. The classification highlights the individualised nature of the classification system and its usefulness in guiding the development of outcome measures that measure functioning at the level of the individual. This issue is relevant to this thesis because individuals with LBP have different functional profiles as a result itself of the multidimensional nature of the condition. Furthermore, contextual factors and environmental factors obviously affect functioning in the ICF. These points are also relevant to this thesis. The studies in Chapter 2 reported the impact of environmental factors, such as workplace, on the ability to work, as well as that of personal factors, such as avoidance behaviour and depression, on functional outcomes.

Figure 3.3: The ICF model of functioning and disability



Definitions in the context of health:

1- **Body Structures** are anatomical parts of the body such as organs, limbs and their components.
2- **Body Functions** are physiological functions of body systems (including psychological functions).
3- **Impairments** are problems in body function or structure such as a significant deviation or loss.
4- **Activity** is the execution of a task or action by an individual.
5- **Activity Limitations** are difficulties an individual may have in executing activities.
6- **Participation** is involvement in a life situation.
7- **Participation Restrictions** are problems an individual may experience in involvement in life situations.
8- **Environmental factors** make up the physical, social and attitudinal environment in which people live and conduct their lives.
9- **Personal factors** are the individual's inherent characteristics, psychological assets and behavioural features which are highly variable and individualised in nature (i.e. age, gender, race, fitness, self-efficacy).
10- **Functioning** is an umbrella term for body function, body structures, activities and participation. It denotes the positive or neutral aspects of the interaction between a person's health condition(s) and that individual's contextual factors (environmental and personal factors).
11- **Disability** is an umbrella term for impairments, activity limitations and participation restrictions. It denotes the negative aspects of the interaction between a person's health condition(s) and that individual's contextual factors (environmental and personal factors).

3.3.1.2 Use of the ICF in physiotherapy clinical practice and management of LBP

The World Confederation for Physical Therapy (WCPT) encourages physiotherapists to use the ICF as a conceptual framework to guide the delivery of physiotherapy care, allocation of resources, patient referral and rehabilitation management (179). Regardless of the WHO's and WCPT's recommendations, the classification system is rarely used in physiotherapy practice (177), which may be attributed to its highly complex categorisation (Table 3.2) for daily use in clinical practice (180). The ICF encompasses a list of 1,454 categories. Each category constitutes units of classification, which are hierarchically ordered. The classification system lacks the ability to provide physiotherapists with meaningful information that can inform their clinical decision-making or for patients.

Table 3.2: Example of ICF categories for LBP

First/chapter level	b2	Sensory functions and pain
Second level	b28	Sensation of pain
Third level	b2800	Generalised pain
Fourth level	b28013	Pain in back

A growing body of evidence suggests that radiological imaging and examination of the spinal structure do not provide both patients and health professionals clear answers on the origin of pain (56,181-184). Despite this evidence, individuals with LBP continue to be provided with biomedical diagnoses, and according to these beliefs, they are prescribed with stabilisation exercises, pelvic belts, supportive vests, spinal injections or stabilisation surgery (184-186). These interventions might lead to negative consequences, such as fear of movement, avoidance behaviour, hypervigilance and disability, which only serve to fuel the vicious cycle of pain (187). Furthermore, the findings of clinical trials testing commonly prescribed physiotherapy interventions for LBP suggest that no management approaches are clearly superior (188-192).

The ICF indicates that physiotherapists are encouraged to focus less on treating the structure or signs and symptoms of LBP and more on targeting the different combinations of beliefs, cognitive, lifestyle and physical abilities that underline and drive LBP (6). Implementation of the ICF in physiotherapy practice might require a paradigm shift in the 'beliefs' of physiotherapists and patients in terms of how they understand and deal with LBP. Current knowledge suggests that LBP should be considered within a multidimensional biopsychosocial framework. This shift in beliefs might require abandoning ineffective practices, learning new skills, and using and integrating new approaches (6). For example, mounting evidence supports the view that targeted multidimensional interventions are more effective than a single intervention to manage LBP in primary care settings (6). Asenlof *et al.* (193,194) showed that individually tailored behavioural treatments targeting activity levels, cognition and motor behaviour demonstrate superior outcomes compared with exercise therapy alone. Another study also showed that a patient-centred multidimensional behavioural approach that targets maladaptive cognitive, lifestyle, pain and movement factors is more effective (greater effect size) than manual therapy and exercise for LBP (195). Despite this evidence, recent research suggested that healthcare providers dealing with LBP have difficulty correctly identifying psychosocial risks in individuals with LBP in a clinical context. Furthermore, Butler and Moseley (196) suggested that many individuals, including health professionals, do not have a modern understanding of pain mechanisms, which might lead

to delayed recovery. A modern understanding of pain and specific training in the behavioural aspects of patient presentation are seemingly important to enable physiotherapists to identify risk indicators from clinical examination (196,197). Hill *et al.* (198) emphasised the importance of targeted and timely initiated interventions in patients at risk for chronic LBP to induce recovery and reduce healthcare costs.

3.4 Summary

The biopsychosocial model is widely accepted within the spinal community. It plays a central role in how health professionals provide care for people with LBP and helps determine future management. The biomedical model allowed significant medical advances through the objective study of the pathoanatomic/pathophysiologic aspects of a disease; similarly, the biopsychosocial model achieved advances by emphasising illness as experienced within different dimensions. Examining individuals with LBP through these dimensions is the strength of this model because people who suffer from LBP and live in a difficult social condition will be more complex than similar people who are not suffering from the same. This model motivates health professionals to consider patients' psychosocial status before care is implemented and changes in the outcomes of therapy are made. The ICF was used in this thesis because it offers a framework on how 'management' might be prescribed and how 'outcomes' are measured. In accordance with the identification of the theoretical basis of current physiotherapy practice, defining the different dimensions of the outcomes of physiotherapy is important. The following section will review the different dimensions of outcomes that are commonly measured following the management of LBP. Then, a critical review of the theory of measurement and measuring scales follows. These reviews are important in this thesis to determine whether the cross-cultural adaptation of one of the existing LBP outcome measures or the development of a new outcome measure for implementation in the Jordanian healthcare system is needed.

Chapter 4: Pain and functioning: Definition and analytical framework

Key points in Chapter 4:

- Pain is a sophisticated *protective mechanism* that alerts the body when there is danger. Tissue injury is neither sufficient nor necessary to generate pain. Pain depends on how much danger the brain 'thinks' the body structures are in, not how much danger the body structures are 'actually' in. Identifying the different dimensions of pain is important in this thesis in order to measure pain appropriately.

- There are four dimensions of pain. These include intensity, impact, quality and location. In comparison to the other pain dimensions, pain impact can be observed by physiotherapists and reported by individuals with LBP. This thesis proposes that Jordanian physiotherapists should observe and measure the impact of LBP on functioning rather than on pain itself.

4.1 Introduction

Chapter 3 of this thesis indicates that the biopsychosocial model plays a significant role in how physiotherapists provide care for individuals with LBP and how they determine outcomes that are important to their patients. The purpose of physiotherapy interventions is to restore lost functions (88). Clinical trials suggest that physiotherapy interventions are more effective in the management of LBP when they are tailored to the individualised needs of patients (193-195).

To demonstrate the effectiveness of physiotherapy in the management of LBP, physiotherapists use different measurement tools. These tools aim to measure different aspects of health-related quality of life; more specifically, they aim to measure pain and function (88,199,200). A recent systematic review that investigated the impact of LBP on adult populations indicate that pain and disability are associated with catastrophisation[7], which leads to delayed recovery (202). Many international guidelines concerning the management of LBP suggest physiotherapy interventions for LBP. They also recommend areas of evaluation that reflect aspects related to pain and function (88,203,204). However, there are new concerns that the current and commonly used measurement tools in the clinical trials of LBP management do not satisfy the theory of measurement (205-211) and that the core sets might not adequately address what is important to individuals with LBP (212-214). Understanding these concepts in the conceptualisation phase is

[7] Catastrophizing is "*an exaggerated negative mental set brought to bear during actual or anticipated painful experience*" (201).

important in this thesis because this research programme aims to develop an appropriate measurement tool that adheres to the theory of measurement [Chapter 5] and measures changes in a construct that is important to individuals with LBP in the clinical contexts in Jordan. The first step in the development of an outcome measure is a theoretically sound definition of the construct of interest (215). This includes identifying the dimensions and the factors influencing them (216,217). The following subsections will utilise relevant theoretical backgrounds and clinical knowledge to achieve an adequate understanding of pain as a phenomenon and the impact of pain on the construct of function. The following subsection reviews the definitions and the dimensions of each construct, as well as the factors related to these constructs. Understanding these constructs from a theoretical perspective is important in this thesis because it will later enable a critical review of the commonly used LBP outcome measures [Chapter 7].

4.2 Pain

4.2.1 Introduction

There is much debate about the definition and measurement of pain (218). It is well established today that pain is a multifactorial subjective sensory experience, which is dynamic, as individual perception of pain changes between different points of time (161,218,219). The purpose of this subsection is to define pain and identify its dimensions.

4.2.2 Definitions of pain

The International Association for the Study of Pain defines pain as "*an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage*" (220). This definition indicates that pain is not always associated with tissue-based injury and that pain experience might or might not occur as a result of tissue damage. It seems that pain happens when the body's alarm system alerts the brain to real or probable tissue damage (196).

There are many misconceptions about pain. These misconceptions might exist because some individuals, including health professionals, do not have a contemporary understanding of pain (196). Motor and sensory elements are closely related to each other at each level within the central nervous system (CNS) (221). Many studies of functional brain imaging confirm that different cortical regions are active during the occurrence of

painful experiences (222). This could generally mean that pain is the final product of responses taking place within the brain's neural matrix (161,223).

It seems that the CNS is not a rigid neural matrix, but rather plastic in nature (161,218). This network of nerve cells and surrounding structures is subject to injury and recovery. However, radiological imaging studies demonstrated little evidence regarding structural nerve damage in the majority of LBP cases. This might add weight to the agreement among health professionals to avoid unnecessary examination and overtreatment by treating symptomatically, along with the persuading individuals with LBP to stay active for LBP management (56,161,224). Despite recent advances in this field, neurophysiology cannot fully explain pain. Butler and Moseley (196) suggest that pain is not in the CNS or specifically in the human cerebrum; pain is an output of the brain (psychology, emotion, environment, social and religion), making it difficult to be defined, expressed or measured. Health professionals might have the impression that they can understand pain and measure it in a reliable manner. However, in reality, this is not the case (207,208,225,226). Many clinical studies have reported that the perception of pain is different among individuals (196,219). For example, Waddell (161) suggested that people with different types of LBP in Oman are significantly under-reporting their pain as compared to their counterparts in the UK. This is because people in Oman accept being in pain for religious reasons. Horn and Munafo (219) suggest that people who have similar injuries might react to pain in different ways. For example, a military officer who has a knee injury in a battlefield and a solicitor who happens to have the same injury in an office might describe pain and report it in a different way due to the differences in contexts (196). These factors make any comparison of pain perception between individuals near to impossible, calling into question the validity of the current pain measures used in clinical contexts. Despite this, health professionals, including physiotherapists, continue to measure pain using different scales [Chapter 7] that aim to measure different dimensions of pain. The following subsection will review these dimensions in more details. Understanding of these dimensions of pain is important in this thesis to critically review the pain scales in Chapter 7.

4.2.3 Dimensions of pain

There are four dimensions of pain; intensity, impact, quality and location (218). Pain intensity refers to how much an individual hurts. Pain impact is another dimension that is related to pain experience. It is considered to be more complex compared to the other dimensions. For example, Chapter 2 in this thesis reviewed the impact of LBP on quality of life. Jensen and Karoly (227), p. 19, define pain impact as "*the degree of emotional arousal or the changes in action readiness caused by the sensory experience of pain*". The previous definition used the term *degree,* which suggests that pain affect can be quantified. The same definition also implies the existence of equal intervals between categories, which is not the case in reality. The definition indicates that fear of pain or avoidance behaviours can lead to limitations in physical activity, alterations to regulatory efficiency or ordinary modes of response. It seems that pain affect is a mental state activated by an implicit or explicit review of risks. For example, the fear-avoidance model is a theoretical model that describes how psychological factors impact the confidence to move and affect the experience of pain influence the development of persistent pain and disability (201). In this model, negative beliefs about pain and negative information about the condition lead to exaggerated negative mental set in which individuals with LBP imagine the worst possible outcome. This catastrophisation leads to fear of movement and avoidance behaviours. This sequence of events strengthens the original negative review of risks in a deleterious cycle. Similarly, positive beliefs about pain and modern understanding of LBP encourage patients to confront their pain problems and be active in the coping process. The fear-avoidance model will be discussed in more details in Chapter 9.

Pain quality is the physical sensation related to pain sensory experience. Terms, such as sharp or shooting pain, are some of the common expressions used by patients when describing pain quality (227). Pain quality is often documented on a body chart that shows the pain location. Pain location means the direct description of where the perceived pain is.

In clinical trials, pain intensity is frequently measured more than the other dimensions of pain. This is worthy of further investigation (208,225,227). A critical review of pain intensity scales is conducted in Chapter 7. It is important to note that at this stage, therapists cannot observe pain intensity, quality and location. Consequently, they have to rely on patients reports concerning these dimensions. However, pain impact on functional

status might be observed by therapists and reported by patients. This chapter suggests that the measurement of pain impact as an outcome of LBP management, is far more important than other pain dimensions. The purpose of the following subsection is to understand the theoretical underpinnings of the construct *functional status*. The following subsection is important in this thesis because it will enable an in-depth critical review of back disability scales [Chapter 7]. It will also facilitate the process of outcome measure development in the second phase.

4.3 Function

4.3.1 Definition of the construct function

A standardised definition of the construct 'functional status' or 'function' is not included in any of the major LBP management guidelines (88,203,204,228). Furthermore, the wide range of linguistic expressions used in research to refer to aspects related to 'functioning' might indicate that research in the area of LBP management lacks a consensus on the definition of the term 'function'. The term 'function' is defined in the Oxford dictionary as "*an activity or purpose natural to or intended for a person or thing*" (229), p. 575. This definition has three important elements. Firstly, the term 'activity' indicates the "*degree to which something displays its characteristic property or behaviour*" (229), p. 13. Secondly, the term 'natural' suggests that it is socially accepted. Thirdly, 'intended for a person' implies that engagement and involvement in this activity is valued and socially important to fulfil a role. Table 4.1 shows some examples of definitions published in the healthcare literature.

Leidy (216) suggested that the term functional status represents the whole domain of functioning. Each of the definitions in Table 4.1 refers to activities, roles or behaviours that individuals engage in during their day-to-day life.

Box 4.1: Definitions of 'Functional status' published in the literature

Bowling (230), p. 6: "*Functional status can be defined as the degree to which an individual is able to perform socially allocated roles free of physically (or mentally in the case of mental illness) limitations. There is a clear distinction from general health status. Functional status is directly related to the ability to perform social roles, which a measure of health status need not take into account. Functional status is just one component of health – it is a measure of the effects of disease rather than the disease itself*".
Meyboom-De Jong and Smith (231), p. 128: "*Level of actual performance or capacity to perform, both in the sense of self-care and in the sense of being able to fulfill a task or role in a given moment or during a given period*".
Patrick and Erickson (232), p. 418: "*An individual's effective performance or ability to perform those roles, tasks, or activities that are valued, e.g., going to work, playing sports, maintaining the house. Most often functional status is divided into psychological, emotional, mental and social domains, although much finer distinctions are possible. Deviations from usual performance or ability indicate dysfunction*".
Ware *et al.* (233), Glossary 3: "*Functional status: the extent to which individuals currently perform their normal or usual behaviors and activities without limitations due to health problems; often used to refer to a variety of concepts of behavioral functioning and well-being*".
Leidy (216), p. 197: "*…it is proposed that functional status be defined as a multidimensional concept characterizing one's ability to provide for the necessities or life; that is, those activities people do in the normal course of their lives to meet basic needs, fills usual roles, and maintain their health and well-being. Necessities include, but are not limited to, Physical, psychological, social, and spiritual needs. There are four dimensions of functional status: Capacity, performance, reserve, and capacity utilization*".

The definitions provided by Bowling (230) and Meyboom-De Jong and Smith (231) suggest the existence of different functional statuses, which might be ranked on a continuum. In addition, Bowling's (230) definition distinguished general health status from functional status. Patrick and Erickson (232) suggest that functional status is a multidimensional concept that represents physical, role, psychological and cognitive functioning.

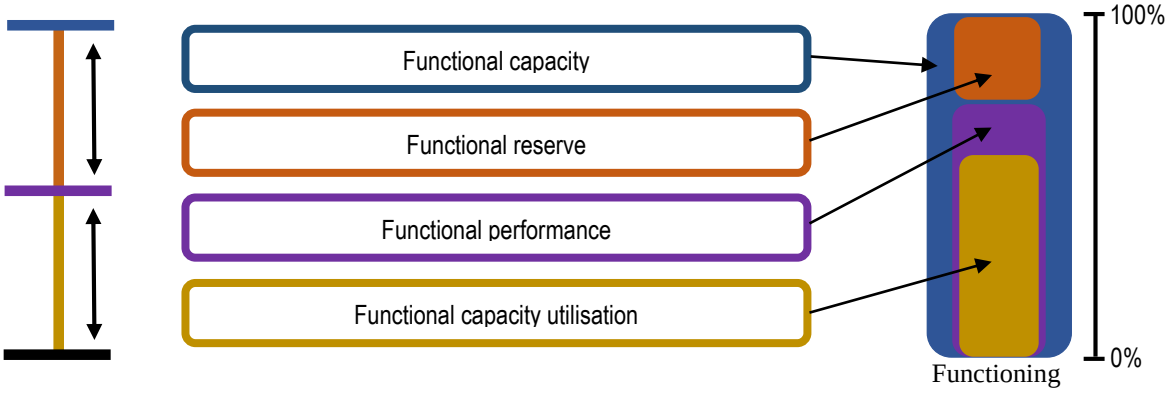
Leidy (216) argued that the previous definitions and models of functioning had problems. For example, the Meyboom-De Jong and Smith (231) definition failed to demonstrate a significant distinction between functional performance and capacity. Consequently, their definition was considered too broad, and to lack the ability to inform or guide treatment planning, study designing or outcome measures development. Another definition of functional status developed by Folta and Metzger (234) provided a conceptual model that addressed the concept of functional capacity from a physiological perspective. Their approach to define function was considered too constrained because it did not show how physiological improvements translate into improvements in day-to-day performance (216).

Ware (215), p. 473, stated that "*definition is the blueprint underlying the construction of health measures*". Therefore, it is important in this thesis to define the construct 'functioning' on a sound theoretical background and on relevant clinical knowledge. This is important to guide the process of developing the new outcome measure later in this thesis [Chapter 10 and 11]. Leidy (216) developed an analytical framework that shows the different dimensions of the construct 'functioning'. Other analytical frameworks of the construct 'functioning' could not be located; therefore, this research programme adopted the framework developed by Leidy in this thesis. The analytical framework was adopted because it appeared to be comprehensive and suggested that a complete analysis of the construct 'functioning' required a concurrent consideration of all dimensions. Leidy's (216) approach is also consistent with Duncan and Velozo's (235) view that a full evaluation of rehabilitation outcomes mandates the utilisation of a battery of outcome measures. Each of these tools is designed for the purpose of measuring one dimension at a time. The separate measurement of each dimension is important to eliminate confusions of what exactly is being measured.

4.3.2 Defining the dimensions of function

Leidy (216) proposed four units of analysis for the construct functioning. These are capacity, performance, reserve and capacity utilisation. Figure 4.2 shows that these dimensions are interrelated. Leidy's analytical framework was developed for the purpose of analysing and measuring one dimension at a time (216).

Figure 4.1: The four dimensions of functioning



(Adapted from Leidy (216); p.198).

4.3.2.1 Functional capacity

Functional capacity is defined as 'one's maximum potential to perform those activities people do in the normal course of their lives to meet basic needs, fulfil usual roles, and maintain their health and wellbeing. The term refers to potential in any domain, including

physical, cognitive, psychological, spiritual, and sociodemographic' (Leidy (216), p. 198). In exercise physiology, functional capacity refers to the maximum physical effort that a person can attain under the conditions of maximal exertion (236). Functional capacity is a function of muscle strength, endurance, coordination and balance (216). The ability to maintain high intensity tasks for a long period of time is dependent on one's functional capacity and on the resources available (216). Treadmill and grip strength tests are two examples of functional capacity measures that are used frequently in physiotherapy (237,238).

Leidy (216) pointed out that functional capacity does not translate into functional performance. Individuals with certain potential to perform physical tasks might not perform these tasks up to the maximum functional capacity. Functional performance is constrained by functional capacity and by the interaction of multiple factors, including physical, psychological, social, cognitive and spiritual demands and constrictions (Figure 4.2).

4.3.2.2 Functional performance

Functional performance is defined as "*the physical, psychological, social, occupational, and spiritual activities that people do in the normal course of their lives to meet basic needs, fulfil usual roles and maintain their health and wellbeing*" (Leidy (216), p. 198). In comparison to functional capacity, functional performance is the observable outcome of individual choice to do or perform an activity to fulfil a biological, psychological, social or spiritual role. The actual level of performance is influenced by contextual factors, such as body structures, or support from others, which enable or inhibit performance.

The empirical and clinical relationship between functional capacity and performance can be explained through the concept of exertion[8]. The closer an individual performs to the limits of functional capacity, the more exertion is required to achieve the next unit of performance (216). The LBP physical functioning indicators developed later on in this thesis belong to and represent this dimension of 'functional status'.

4.3.2.3 Functional reserve

Functional reserve is defined as "*the difference between capacity and performance, one's functional latency and dormant abilities that can be called upon in time of perceived*

[8] Exertion is "*the cost of moving to the next level of performance and this must be weighed against the benefits*".

need" (Leidy (216), p. 199). The size of the difference between functional capacity and performance naturally varies from one individual to another (216). According to Leidy's (216) definition, functional reserve is called upon only in times of need where high levels of exertion are necessary in uncommon circumstances. For example, athletes tend to have higher physiologic functional reserve than non-athletic people, who in turn have more reserve than individuals with acute or chronic health conditions (216).

4.3.2.4 Functional capacity utilisation

Functional capacity utilisation is defined as "*the extent to which functional potential is called upon in the selected level of performance*" (Leidy (216), p. 199). Leidy (216) suggested that this concept refers to the extent to which individuals recognise their potential, and that it is inversely related to reserve (Figure 4.2). According to Leidy's (216) model of functioning, when functional capacity utilisation increases, it in turn increases the level of exertion. When functional performance increases, approach capacity, which means functional reserve, will also decrease. This analytical model proposes that health interventions should be directed and designed to improve functional capacity utilisation in an attempt to enhance performance and augment life quality. The response choices in each of the TELER LBP indicator developed in this thesis [Chapter 11] represents the functional capacity utilisation of each daily activity identified as important by Jordanian individuals with LBP in a qualitative study [Chapter 9].

4.4 Summary

This chapter suggests that pain is an individualised experience. Pain is a complex symptom; other factors, such as human behaviour, psychology, patient expectations and attitudes, beliefs and the surrounding environment, should be considered when managing pain. Pain experience and the previously mentioned factors cannot be separated, as they are dynamically interacting and are not the final product of a linear sensory transmission system.

In comparison to the other dimensions of pain, pain impact can be observed by clinicians and reported by patients. This thesis proposes that Jordanian physiotherapists should observe and measure the impact of LBP on functioning rather than on pain itself. Following the identification of what should be measured, it is important to determine how it should be measured. This requires the critical review of the theory of measuring scale and scaling methods to develop a theoretical framework of measurement in a clinical context.

The purpose of the next section is to develop this theoretical framework of measurement in a clinical context. The development of this framework might make it possible to critically review pain and back-disability measurement tools used frequently in the field of LBP. These tools will be critically reviewed according to their content, their adherence to the theory of measurement and the criteria of measurement in clinical context.

Phase 1: Conceptualisation of the problems

Section 1: Knowledge underpinning LBP and physiotherapy interventions

Chapter 1: Knowledge underpinning low back pain

Chapter 2: Impact of LBP on individuals' quality of life

Chapter 3: LBP Management models

Chapter 4: Pain and functioning: Definition and analytical framework

Section 2: The theoretical underpinning of measurement

Chapter 5: A review of the theory of measuring scale and scaling methods

Chapter 6: A critical review of the quality criteria required in a measurement tool for clinical utility

Chapter 7: A critical review of existing LBP outcome measures

Chapter 5: A review of the theory of measuring scales and scaling methods

Key points in Chapter 5:

- Measuring the outcome of healthcare is a key element in determining therapeutic effectiveness and, consequently, the delivery of evidence-based healthcare. This chapter suggests that the measurement of 'functional status' can be used for both physical examinations in the initial assessment sessions and as an outcome measure in follow-up sessions.

- The majority of LBP scales are ordinal in nature because they are used to measure constructs, such as symptom status and functional status.

- Different scaling methods were used to construct the current LBP scales. The critical review in this thesis revealed that the Guttman scaling approach is capable of converting observations into quantifiable data.

5.1 Introduction

In the first phase, Section 1 suggested that targeted-physiotherapy interventions helped to reduce the negative impact of pain on an individual's quality of life, restore lost functions or both simultaneously; however, the effectiveness and the efficiency of most physiotherapy interventions have not been established, and there is often weak evidence supporting physiotherapy interventions (239-247). The difficulties in measuring the effectiveness of therapeutic interventions are partly related to the complex, multidimensional and subjective nature of the constructs, namely pain and function (216,218,248).

Outcome measures are essential to successful clinical practices, especially regarding the current efforts to enhance healthcare quality and the successful evaluation of the effectiveness and efficiency of therapeutic interventions (24). Several LBP outcome measures have been developed to measure pain and function before and after physiotherapy interventions in both clinical trials and in clinical contexts (88,199,200,203,204); however, little is known about their development and their appropriateness for use in clinical practices (249-252). Therefore, Chapter 5 will begin by examining a conceptual model that identifies the clinical variables that influence the process of measurement during the different stages of healthcare. This conceptual framework will be slightly modified to translate the findings of the first section in Phase 1, to demonstrate how therapists shifted their focus from establishing diagnoses to

measuring patient outcomes, to demonstrate the transition from developing clinician-based measurement tools to the development of a patient-specific outcome measure and from measuring the effectiveness of unidimensional treatment to multidimensional management. This will be followed by a critical review of the theory of measuring scales and scaling methods and the quality criteria required for a measurement scale for clinical utility. These critical reviews are important later in this thesis to develop a theoretical framework of measurements in a clinical context that will enable critically reviewing six of the most commonly used outcome measures in the LBP field. This new theoretical framework will also guide the development of a new LBP outcome measure in the second phase of this research programme.

5.2 Exploring a conceptual model of patient outcomes

Measuring the outcomes of healthcare is a key element in determining therapeutic effectiveness and, consequently, the delivery of evidence-based healthcare (23,24). The quantification of therapy outcomes has become imperative in musculoskeletal rehabilitation for two primary reasons. The first reason is that healthcare professionals have continually attempted to find a way to provide clinical information that answers questions related to the effectiveness of therapy. The second reason is related to the continuous development of a theoretical basis for physiotherapy practices in musculoskeletal rehabilitation (73,253).

Conceptual models play a key role in how observers[9] identify constructs that are important to measure in research and clinical practice (23). Wilson and Cleary (254) developed a conceptual model (Figure 5.1) that shows the different stages of the evaluation of medical care and the different factors that influence the measurement of outcomes.

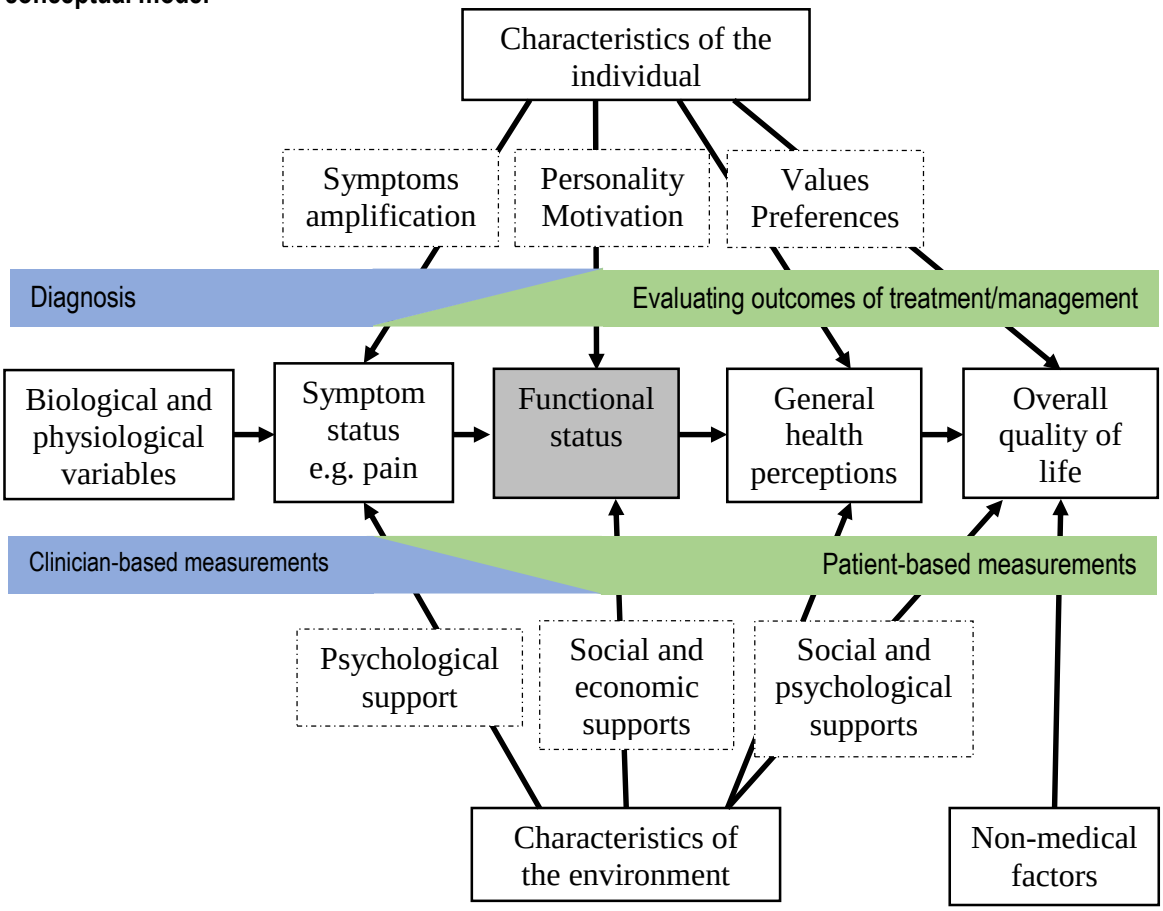
In this model, arrows indicate the important flows of influence. The authors of this model acknowledged that there may be reciprocal relationships (24). For example, in different qualitative studies, individuals with LBP (*symptom status*) reported that fear of movement (*symptom amplification*) led to functional limitations (*functional status*), which led to depression (*general health perception*) and poor quality of life (5).

[9] The person who undertakes the measurement will be called the 'observer' in this thesis.

5.2.1 From establishing a diagnosis to an outcome measurement

According to the Wilson and Cleary (254) model, when diagnosing LBP, the focus of clinicians and therapists is on the left-hand side of the model, while for the examination of outcomes of health problems or therapeutic interventions, the levels on the right-hand side are more relevant. Usually, when physiotherapists manage a complex condition, such as LBP, they consider the functional status to be both a diagnosis and an outcome of physiotherapy interventions. This indicates that the outcomes of LBP are assessed at different levels, ranging from the pathophysiological parameters to the health-related quality of life (HRQL).

Figure 5.1: Relationships between measures of patient outcomes in a health-related quality of life conceptual model



Adapted from Wilson and Cleary (254), p. 60.

5.2.2 From clinician-based assessments to self-reported patient-based measurements

There are variables in the Wilson and Cleary (254) model that can be directly observed, such as disc degeneration via radiological imaging, which are referred to as clinician-based assessments. Other variables that cannot be directly observed, such as an

individual's perception of the overall level of QOL, require self-reported measures or patient-reported outcome measures (PROMS). The clinician-based assessment tools are usually located on the left-hand side of the model, and the patients' self-reported measures are located on the right-hand side (24); however, the functional status is examined through either self-reported questionnaires or observations by clinicians. For example, physiotherapists frequently ask patients to perform certain physical activities during the initial assessment sessions to assess the impact of LBP on functional status. Physiotherapists also use standardised questionnaires, such as the Quebec Back Pain Questionnaire (QBPDS), to examine physical functions following physiotherapy.

5.2.3 Objective and subjective measurements

Any involvement of personal judgment in the process of measurement will determine whether the measurement tool is objective, including measuring bone density using radiological imaging or subjective measurements, such as measuring back-disability using the Oswestry Disability Index (ODI). Hypothetically, objective measurements do not involve any personal judgment; however, the assumption is that the person who is doing the measurement possesses adequate knowledge regarding how to use the tool. Furthermore, the interpretation of these objective measurements may be subjective in nature. For example, health professionals may disagree about what should be considered a 'normal' bone density. Therefore, health professionals currently focus less on the terminologies 'objective' and 'subjective' and replace them with 'history' and 'physical examination' (248).

Due to the current lack of knowledge regarding the identification of a cause for the majority of LBP cases, clinicians heavily rely on the measurement of symptoms, such as pain and functional status. The existing measures that examine the symptoms of LBP are often subjective in nature. Therefore, the majority of LBP outcome measures are located on the right-hand side of Figure 5.1. Six of the most commonly used LBP outcome measures will be reviewed in more detail in Chapter 7.

5.2.4 Unidimensional to multidimensional characteristics

On the left-hand side of Figure 5.1, there are many examples of unidimensional constructs, such as range of movement and bone density. The characteristics on the left-hand side of the model represent only one aspect of a disorder. On the right-hand side of Figure 5.1, the perceived health status, or HRQL, represents more complex

characteristics. Multidimensional constructs, such as functioning, encompass not only the physical aspects but also the psychological and social aspects of health. For example, in Chapter 2, the systematic review showed that individuals with LBP (*with limitations in functional status*) tend to avoid social occasions (*social functioning*) because they feel embarrassed (*mental functioning*) about discussing their pain (*symptoms status*).

After exploring the clinical variables that influence the process of measurement during the different stages of healthcare, knowledge of the theory underlying the measurement is required to critically review the existing LBP outcome measures, or, if necessary, to develop an appropriate outcome measure for use in the clinical context (255). The theory of measuring scales will be discussed in more detail in the following subsection.

5.3 The theory of measuring scales

The term 'measurement' has been defined by a number of authors. For example, Stevens (171), whom many considered the author of the scales of measurement, defined measurement as the "*assignment of numerals to objects or events according to rules, any rule*" (Stevens (171), p. 19). In his definition, Stevens clarified that the measurement process involves a systematic allocation of numerals to observations according to a priori rules of measurement. A numeral is a numeric label that has no value (256). This definition, therefore, ignores the problem of quantifying the label. Perhaps the definition that is most appropriate in the context of this thesis is that of Michels, who suggested that "*measurement is the act of converting observations into data, and includes classifying, counting, ranking, and quantifying*" (Michels (257), p. 210). Michels' definition is more relevant to this thesis because it implies that quantification is an integral part of the measurement process.

As section 1 in the first phase outlined, if the measurement of the impact of LBP on functional status is an integral part of any study on the effectiveness of physiotherapy, it may be argued that Michels' definition of measurement supports the use of functional status if this construct could be converted into quantifiable data. These data might provide evidence of effective practice if the measurement is carried out in a clinical context by physiotherapists for LBP patients (258).

Measurement theory underpins the development of measurement tools because it provides the rules and conditions that control the process of transforming observations into units of measurement (258). It is concerned with how the scores generated by a

scale's items represent the construct to be measured (259). It is important to understand that to perform measurements according to the measurement theory, the items of a scale must measure one construct (e.g., physical functioning) at a time (216) despite the fact that the health problem might affect different dimensions of quality of life at the same time (5). The measurement of one concept at a time is important to prevent any confusion regarding what exactly is being measured (216). The measurement tool should measure all aspects of the construct of interest (e.g., functional performance) simultaneously; otherwise, it will generate meaningless statements and conclusions (216,260). This is important because health conditions, such as LBP, tend to change over time. Thus, scales directed to measure attributes, such as pain impact or limitations in functional performance, must be able to capture these changes, thereby informing clinical decisions in a timely manner. This will be further discussed in Chapter 6 of this thesis.

The measurement of a construct such as pain is possible if the measurement systems satisfy certain conditions and are able to measure this construct indirectly using multiple observable items. For example, in Figure 5.1, constructs such as functional status can be observed by clinicians and reported by patients. Therefore, functional status is often used in research and clinical practices to measure the effectiveness of physiotherapy interventions in the management of LBP.

The theory developed for the study of the rules and conditions underpinning measurement is the theory of measuring scales, and these rules are the subject matter of the theoretical investigations in the following subsections.

5.3.1 Levels of measurement

Stevens (261) proposed in his publication *On The Theory Of Scales Of Measurement* that measurement exists in a variety of forms and can be categorised into certain specific classes. These classes are nominal, ordinal, interval and ratio. The understanding of these levels of measurement is very important later in this thesis to guide the critical appraisal in Chapter 7 and to determine the appropriate level of measurement to represent the outcome of interest for Jordanian individuals with LBP. It is also necessary to determine the appropriate statistical operations to analyse the information obtained by the new measurement tool. The aim of this subsection is to discuss the criteria that distinguish between the different levels of measurements to understand the specific characteristics of each level.

5.3.1.1 The nominal scale

The operation of differentiating is the only feature of this level; clinicians can divide variables into dichotomous answers, such as ‘male’ or ‘female’. Numerals are assigned to each category according to the rule N' = s (N), which is that the new numerals (N') might be any direct substitution for the original numerals. Stevens’s rule for the nominal scale is “*two classes which are different with respect to the variable or quality being measured shall not bear the same name; two individual objects which are the same with respect to this quality shall not be placed in classes bearing different names*” (Senders (256), p. 52).

If numbers are selected to represent responses within the nominal scale, researchers should be aware that the formal arithmetic rules that apply to numbers do not apply to the entities that are represented by the numbers in a nominal scale. Only basic arithmetic operations (i.e., counting) can be applied to these numerals. For example, if a questionnaire was distributed with the answers ‘yes’, ‘no’ and ‘uncertain’, the frequency of these responses could be calculated.

5.3.1.2 The ordinal scale

After determining that two things are either different or alike, it may be possible to find out whether one has more or less attributes of a particular quality than another. For example, if four tennis players are categorised in order, Smith might beat John, Peter and Glen all of the time; Peter can beat John and Glen but not Smith all of the time; John can beat Glen, but he cannot beat Peter and Smith all of the time; and Glen is beaten by the other players all of the time. Number ‘1’ might be assigned to Smith, ‘2’ to Peter, ‘3’ to John and ‘4’ to Glen. Basic arithmetic operations, such as addition, are not permitted in calculating the results obtained by the ordinal scale. For instance, when the game involves two players against two, we assume that 1+4 = 2+3 (Smith and Glen play against Peter and John). This might not be the observed result in reality as Smith, Peter and John might be Olympic champions and Glen by chance have just seen a racket for the first time. If ‘4’ is assigned to him, the other players should have six digit numbers.

When numerals are allocated to classes on an ordinal scale, the order in relation to the numerals is important, but their absolute values are not; the differences in the quantity of any two adjacent classes within the ordinal scale are not equal.

Three different roles must be applied as a minimum requirement to consider a measurement an ordinal scale. The first role is *connectedness*, which simply means if A ≠ B, then either A > B or A < B. In other words, if A is different from B, then it may be that A has more of the quality than B or that A has less of the quality than B.

The second role is *transitivity*, which means if A has more of the quality than B and B has more of the quality than C, then A has more of the quality than C (A > B and B > C then A > C). The third role is *asymmetry*, and this simply means that if A has more of the quality than B, then B does not have more of the quality than A (A > B then B ⊁ A). It is important to mention that the majority of the scales developed within the LBP field are ordinal scales (73,262,263). This will be further discussed in Chapter 7 of this thesis.

5.3.1.3 Interval scale

Interval scales have clear and equal units of measurement (e.g., one Celsius degree); however, the interval scale does not have an absolute zero, which limits the arithmetic operation to only addition and subtraction. It is possible to perform these arithmetic operations if equality, symmetry and transitivity are present as three characteristics of the interval scale. Senders (256) indicated that the relationship of equality is reflexive (A = A), symmetrical (if A = B then B = A) and transitive (if A = B and B = C then A = C).

5.3.1.4 Ratio scales

The ratio scale is the last level of measurement. It is quite similar to the interval scale, but it has an absolute zero. Thus, it is possible to perform different arithmetic operations, such as addition, subtraction, multiplication and division (256). Levels of measurement are important for the development of new scales, especially for the scaling method. This will be discussed in detail in the next subsections.

5.4 Scaling methods

The mathematical structure (i.e., level of measurement) to measure a clinical phenomenon is dependent on the hypothetical structure of that phenomenon (i.e., functional status) under scrutiny (264). Hinds (265), p. 346, stated:

> *"The selection of the method by which the phenomenon is measured, depends upon the clinical meaning of the measured phenomenon and the clinical interpretability of the resulting score"*.

Scaling methods are central to the construction of outcome measures (266). Simultaneous with the identification of what is to be measured is the identification of a method of scaling that is suitable for detecting changes or a lack of changes before and after therapeutic interventions in a clinical context (23,76).

To ensure that the clinical meaning is preserved during the process of measurement, the chosen method should conform to the specifications of the construct under scrutiny (Chapter 4 and Subsection 5.2), the rules of the levels of measurement (Subsection 5.3) and the standards of measurement in a clinical context (Chapter 6). The fulfilment of these requirements ensures the construction of a valid, reliable and responsive outcome measure for individuals with LBP attending physiotherapy in a clinical context (76,267). The continuous scrutiny of these requirements will also ensure the construction of a useful, informative and meaningful outcome measure later in this thesis (267).

The complex and multidimensional nature of LBP dictates the design of multidisciplinary and individualised interventions to target the outcomes of interest for the patients (198,268,269). Many outcome measures were developed to trace changes in the various dimensions of the LBP experience (9,208,270).

Typically, outcome measures are composed of three elements: a stimulus element (the item stem), a response part (the response choices) and the scaling methods (266). The stimulus element is usually a short sentence or phrase that describes one attribute of quality of life, such as social functioning or physical functioning. The item stem should contain one concept, and the different items in a scale should belong to one dimension. Any item in a scale aiming to measure more than one concept in one indicator would be problematic for the respondent. For example, section seven in the ODI aims to measure activity and participation, body functions and environmental components simultaneously. These double or triple direct questions in one item, which simultaneously touch upon more than one concept, would be a source of confusion for the respondents who are rating themselves due to a lack of clarity and uncertainty over what exactly is being measured (210).

The second element in constructing a measurement scale is the response choices. Different formats of response choices were used previously in HRQOL outcome measures (91). For example, many measures used the Visual Analogue Scale (VAS) format in the measurement of pain intensity. Other measures, such as the Quebec Back Pain Disability Scale (QBPDS), used a Likert format (See Table 5.1). The response

choices for each of the methods of measurement varied in both their underlying levels and units of measurement (23,266,271). The definition of the unit of measurement also varied. For example, indicators that test patient satisfaction could be associated with a binary response format, such as 'agree' or 'disagree'. Similarly, indicators that measure a construct such as physical function could be associated with a ranking response system that reflects respondents' abilities to perform various functional movements. The response choices differ in the number of scale points (or codes) given to the respondents, and they usually range from 2 to 5 scale points (266). Some of these scale points are anchored using words or phrases (Table 5.1).

Table 5.1: Different formats of response choices used in HRQOL outcome measures

Type	Description	Example
Visual analogue scale (VAS)	A horizontal or vertical line of fixed length (usually 100 mm) with words that anchor the scale at the extreme ends and no words describing intermediate positions. Subjects are instructed to place a mark on the line corresponding to their perceived state.	How would you rate your pain, today? No pain — Unbearable pain
Anchored or categorized VAS	A VAS that has the horizontal or vertical line of fixed length (usually 100 mm) with words that anchor the scale at the extreme ends and words describing intermediate positions.	How would you rate your pain, today? No pain Slight Moderate Extreme Unbearable pain
Likert scale	An ordered set of discrete terms or statements from which subjects are asked to choose the response that best describes their state or experience.	How would you rate your overall quality of life, today? Poor Fair Good Very good Excellent
Rating scale	A set of numerical categories from which subjects are asked to choose a category that best describes their state or experience. The ends of the rating scales are anchored with words but the intermediate categories do not have descriptive labels.	How would you rate your overall quality of life, today? 0 Poor 1 Fair 2 Good 3 Very good 4 Excellent
Checklist	Checklists provide a simple choice between a limited set of response options such as Yes, No, and Don't know.	Today would you rate your overall quality of life as good? Yes No Don't know
Binary format	The simplest checklist with only two responses options such as yes or no.	Today would you rate your overall quality of life as good? Yes No

From Walters (91).

The next subsection will critically review the three scaling methods that were used in the construction of measurement tools in the field of healthcare (266), which are the Thurstone, Likert and Guttman methods. These are the most common scaling methods used in the construction of outcome measures (266).

5.4.1 Thurstone method

The Thurstone method was originally developed by Louis Thurstone in 1929 (272). This scaling method aimed to develop a format for generating groups of indicators of a construct of interest that have at least one empirical structure between them (266,271). For example, a group of judges, such as individuals with LBP, are asked to assess a large number of items that are *thought* to be indicators of a construct of interest. The approach

for constructing a scale using the Thurstone method is described in Table 5.2, which also shows the assumptions' advantages and disadvantages.

The responsibility of each judge is to rate each statement on a 1-11 point scale in terms of how much it indicates a favourable representation of the construct of interest. For example, if the construct of interest is the impact of LBP on an individual's physical activities, the judges will be asked to assign a score of 1 to the very weakest and a score of 11 to the very strongest indicators. Intermediate scores will be assigned to the statements *felt* to be somewhere in between. Once the judges complete this step, the researcher examines all scores and decides which items have generated the greatest agreement between the judges. The items in which the judges disagreed largely would be excluded as ambiguous.

Among the indicators that produce a general agreement in scoring, one or more would be allocated to represent each scale score between 1 and 11. However, the process of constructing a scale using the Thurstone method is not commonly used in research (266,271) for many reasons, including the unclear units of measurement and the requirement of a large amount of time and resources (Table 5.2). Still, it was used in the development of the response choices (273) of the Sickness Impact Profile (SIP). Twenty-four items were selected from the SIP to develop the Roland Morris Disability Questionnaire (RMDQ) in 1983 (274). The RMDQ has been identified in this research programme as one of the most commonly used outcome measures for people with LBP following physiotherapy interventions.

Table 5.2: **Summary comparison between different scaling methods**

Scaling method	Assumptions	Scale construction	Advantages	Disadvantages
Thurstone (Equal-appearing interval)	• Concepts are assumed to be unidimensional. • The description of concept should be as clear as possible. • Judges have a clear idea about the concept that been measured.	1. Developing the focus for the scaling project. 2. Generating a large set of potential scale items that describe specific construct of interest. 3. Ambiguous items will be removed. 4. Judges will independently assess items and rate each statement on 1-to-11 scale in terms of their representativeness of the phenomenon under examination. 5. Computing scale score values for each scale item. 6. Visual inspection of items for inconsistency 7. Average value for retained items will be estimated. 8. Select items that are *at equal intervals* across the range of medians.	• Role of external experts.	• Unclear unit of measurement. • Violate the specifications and rules of the theory of measurement. • Representativeness of judges. Judges could mistakenly reflect on their beliefs about the construct of interest under examination, instead of rating representativeness of items on scale points such as 1 = strongly disagree and 11 = strongly agree). • Judges perspective towards the phenomena under examination could change with time. • The quality of judgments is dependent on the judges' experience with the construct. • Scales generated in one clinical context cannot be transferred to other settings. • Requires a large amount of time and resources. • Persons with identical scores may have different traits. • The assumption that data collected are continuous where in reality is a subjective ordinal ranking.
Likert (Summated)	• Concepts are assumed to be unidimensional. • Items reflect the variable under consideration. • Items provide a good measure of the variable. • Scoring of items is uniformed.	1. The researcher assembles a large number of statements concerning the dimension need to be measured. 2. Each of the test items is classified by the researcher as generally "*favourable*" or "*unfavourable*" with regard to the construct under study. No attempt is made to scale the items; however, a pre-test is conducted that involves the full set of statements. Ideally, the initial classification should be checked across several judges. 3. In the pre-test the respondent indicates approval (or not) with *every* item. 4. Each response is given a numerical weight (e.g., +2, +1, 0, −1, −2).	• Easy to construct. • Subjects/respondents used to them. • Lend themselves to ordinal levels of measurement. • Use common measurement format.	• Unclear unit of measurement. • Violate the specifications and rules of the theory of measurement. • Extra efforts are needed to interpret scores obtained in a clinical context. • Assumes each item has an identical weight. • Persons with identical scores may have very different traits. • Problem of validity.

		5. The individual's *total-attitude score* is represented by the algebraic summation of weights associated with the items checked. 6. On the basis of the results of the pre-test, the analyst selects only those items that appear to discriminate well between high and low total scorers. 7. The 20 to 25 items finally selected are those that have discriminated *"best"* (i.e., exhibited the greatest differences in mean values) between high versus low total scorers in the pre-test.		
Guttman (Cumulative)	• The purpose of Guttman scaling is to establish a one dimensional continuum for a construct under measurement. • The Guttman scaling is used to predict item responses perfectly knowing only the total score for the respondent. For example, if a respondent have a score of four in ten items scale then this respondent agree on the first four statements. • The Guttman scale should conform with a perfect linear pattern.	• Define the focus of the scale. • Develop a sample of items. • A group of judges will rate the items. • Subject item responses to scalogram analysis • Eliminate errors • Develop the Cumulative scale. • Administrating the scale.	• Uni-dimensional • Highly reliable • Lend themselves to ordinal levels of measurement	• Violate the specifications and rules of the theory of measurement. • Little guidance for the selection of items • Problem of validity • Unequal intervals. • Poor definition of the unit of measurement. • Individuals who did not fit with the pattern are excluded from the study. • Scales generated in one clinical context cannot be transferred to other settings. • The perfect pattern of the Guttman scaling is highly problematic in clinical contexts.

Babbie (271,275), p. 178-183.

5.4.2 Likert method

The Likert method was developed by Rensis Likert in 1932 (276). It is one of the most commonly used subject-centred scaling methods in the construction of measurement tools (271). This method was developed in an attempt to enhance the levels of measurement in social research through the use of standardised response choices in questionnaires to determine the relative intensity for different indicators (271). The steps for constructing a Likert scale are described in Table 5.2. Even though the majority of studies within the HRQOL literature do not report which method of measurement is used in the construction of scales, many scales, such as QBPDS, use a Likert response format (277-279).

5.4.3 Guttman method

The aim of the Guttman method is to establish a unidimensional continuum of statements that summarise several discrete observations (280). Guttman developed the scalogram technique to ascertain unidimensionality (266,271). This method of scaling allows for the possibility of predicting item responses perfectly by knowing only the overall score of the respondent. The Guttman method aims to identify a list of indicators that conform to a consecutive pattern. The assumptions, advantages and disadvantages of the Guttman scaling method are illustrated in Table 5.2.

The focus of this method is the property of unidimensionality in a scale (280). This unidimensional scale, according to the Guttman method, and the knowledge of the respondent score should allow researchers to reproduce the respondents' item score patterns (266). In a unidimensional scale, items are organised in order of endorsement or descriptiveness in a logical manner so that a positive response to an item should imply a positive response to all other items lower on the scale, and vice versa, if a negative response has been given (Table 5.3).

Table 5.3: An example of a walking ability scale with the responses of six patients

Walking ability	Patients					
Items	**A**	**B**	**C**	**D**	**E**	**F**
I am unable to walk.	1	1	1	1	1	1
I am able to walk with assistance of a walker.	1	1	1	1	1	0
I am able to walk with the assistance of a crutch.	1	1	1	1	0	0
I am able to walk with the assistance of a cane.	1	1	1	0	0	0
I am able to walk under supervision.	1	1	0	0	0	0
I am able to walk independently.	1	0	0	0	0	0

1 = (yes) and 0 = (no)

5.5 Discussion

This chapter suggested that within the context of spine care, many outcome measures have been developed to measure symptoms and functional status. Physical functioning, in particular were one of these constructs that can be observed by clinicians and reported by patients.

The majority of LBP outcome measures have an ordinal level of measurement (206,207,262,270,281). This may be due to the characteristics of functional status, per se [Chapter 4]. There are no clear units in functional status; however, the performance of different activities can be ordered in a logical sequence of events. For example, no individual can walk without first being able to stand up, and the ability to walk is one of the most important requirements before being able to run. According to Chapter 4 of this thesis, functioning meets the characteristics of an ordinal level of measurement. It is possible to rank physical abilities on a Guttman scale according to the roles of the ordinal levels of measurement. This will be important later in this thesis in the development phase when selecting an appropriate measurement system that conform to the characteristics of functioning and the assumptions of the theory of measuring scales.

To ensure that the clinical meaning is preserved during the process of measurement, the chosen method should conform to the specifications of the construct under scrutiny [Subsection 5.2], the rules of the theory of measuring scales [Subsection 5.3] and scaling methods [Subsection 5.4]. It is equally important to meet the criteria required in a measurement tool to use it in a clinical context. These criteria will be reviewed in Chapter 6.

5.6 Conclusion

The fulfilment of the rules of the theory of measuring scales and the requirements of scaling methods ensures the construction of a valid, reliable and responsive outcome measure for individuals with LBP attending physiotherapy. The continuous scrutiny of these requirements during this research will also ensure the construction of a useful, informative and meaningful outcome measure later in this thesis that measures the effectiveness of physiotherapy interventions.

The following chapter will review the criteria required in a measurement tool to use it in a clinical context, and in Chapter 7, a critical review of commonly used LBP outcome measures used in clinical practice will be presented.

Chapter 6: A critical review of the quality criteria required in a measurement tool for clinical utility

Key points in Chapter 6:

- This chapter suggests that the majority of outcome measures developed for research are not suitable for use in clinical contexts. This chapter proposes that outcome measures developed for use in clinical contexts might be suitable for use in research.

- Most studies on the psychometric properties of scales focus on providing compelling evidence for validity and reliability; however, less attention is directed towards responsiveness.

6.1 Introduction

The first section in the conceptualisation phase examined the prevalence, personal and environmental factors and the impact of LBP on people's lives. The first section provided an in-depth understanding of the burden of the problem on society, the healthcare system and the individual. The first section also reviewed the management models of LBP and the definition of pain and functional status. These reviews provided a conceptual understanding of the constructs that are affected by LBP and the modern models used to manage this disorder. The second section discussed the theory of measuring scales and scaling methods. The second part in the conceptualisation phase is very important because the aim of this thesis is to develop a clinical measurement tool for use in the Jordanian healthcare system. Therefore, the purpose of the current chapter is to support the idea that outcome measures should be developed in the frame of the application (i.e., clinical context).

It is important to begin this chapter by pointing out that there is an international demand for the delivery of high-quality effective, efficient and patient-centred care (282). One of the barriers in implementing EBP in Jordan in the clinical context is the lack of appropriate outcome measures (19). Measuring the outcomes of interventions using a suitable measurement tool that reflects the quality of care is crucial in addressing this demand.

Pertinent outcome measures might provide useful information about various aspects of care, such as (16):

- A description of the natural history of the disorder and the impact of it on an individual. This is achieved through the measurement of relevant outcomes over time. These longitudinal measurements of outcomes might provide information regarding the LBP clinical course and consequently enhance the current understanding of LBP.
- The evaluation of therapeutic interventions in clinical trials to determine their effectiveness.
- Scrutiny of clinical judgment, including initial assessment and treatment planning. This is achieved through the longitudinal monitoring of outcomes.

Chapter 1 suggested that our current understanding of the causes of LBP is rudimentary. The evidence-based paradigm is not embedded in the health services culture (19). In such circumstances, the primary determinants of the best clinical decisions are the clinician's judgment, which is guided by clinical experience, limited scientific evidence and patient preferences (283). This experiential knowledge is one important aspect of EBP (284); however, research findings and patient preferences are equally important to experiential knowledge, and EBP requires the integration of all of these components simultaneously. This further highlights the urgent need to examine Jordanian individuals' experiences of living with LBP and to develop a suitable outcome measure that is appropriate for service evaluations in a clinical context.

In the context of this thesis, an appropriate outcome measure is needed to serve as a feedback tool for physiotherapists to assist informed clinical decisions regarding whether or not to continue musculoskeletal rehabilitation, stop therapy and refer the patient to other services or other interventions to induce recovery and consequently improve the patients' experiences of care. When combined with an appropriate documentation system, measurement provides legal credentials that explain the practice and assist in the process of clinical reasoning (74). Moreover, a comprehensive documentation of relevant clinical outcomes can guide clinical reasoning and provide transparent reviews for auditing purposes. The following subsections will discuss the similarities and differences between the properties required in an outcome measure for use in research and in clinical practices. The understanding of these requirements is important in this thesis to ensure the development of a measurement tool that is dynamic enough to meet the requirements of both the clinical context and the research.

6.2 A comparison between patient reported outcome measures (PROMs) that are developed for research and clinical practices

Due to the lack of suitable PROMs in the Jordanian healthcare system, the National Health Services (NHS) in the UK will be used as an example in this subsection to demonstrate the different uses of PROMs in research and clinical practices. In the UK, there is a demand to transform healthcare services to assist patients and clinicians in making better decisions and to offer comparisons of providers' performances to stimulate improvements in healthcare services (285). In response to these demands, PROMs were developed to stimulate these changes in how healthcare is organised and delivered to improve healthcare quality (10).

PROMs were originally developed for research and audit purposes; however, PROMs were adopted and used in a clinical context to inform clinical decision-making (10). Measures used to inform research and audits involve data being collected, aggregated and analysed on a group level (11,12). Different studies indicated that PROMs, which possess adequate psychometric properties at the group level and perform satisfactorily in the measurement of outcomes in clinical trials, are not necessarily suitable for the evaluation of clinical outcomes on the level of the individual in a clinical context (13-16). This is because data collection in research mainly aims to generate generalisable findings, while data collection in clinical contexts aims to inform individual's care (10,17,18).

This conflict between the two aims and the widespread mandatory implementation of PROMs in the NHS without adequate training in how to use them might cause harm rather than help an individual patient's care. The primary motivation behind developing PROMs was to improve patient care; however, the process of how researchers undertook this task and developed the current PROMs was found inadequate in achieving this goal (18). The clinicians who use PROMs in clinical practices might not know the answers to the following questions (286):

- What a particular PROMs score means (e.g., what a VAS score of 6/10 mean,)?
- How clinicians can safely interpret and report data?
- How much change is enough?
- How often to use these data in clinical practice?
- When not to use PROMs in a clinical context?

The attention on the process of quantification in research has moved the focus of the research community from developing PROMs that facilitate clinical reasoning and promoting partnerships between individuals and health professionals to the focus on developing rigorous studies designed for research purposes with significantly less attention on the appropriateness for use in clinical, home or community settings (287-292). This shift in attention might have occurred as a result of the belief created by the dominant scientific perspective that considers health records and all types of qualitative clinical data as 'soft' and insufficient to fulfil the requirements of scientific evidence (293).

The research environment is different from a clinical environment (294). The purpose of outcome measurements in clinical trials is to compare groups of patients, usually over a relatively short period of time, thus potentially missing variations in responses that can occur over longer periods of time (295). Until recently, clinical trials were usually conducted in highly-selected populations of patients with few comorbidities to meet the often meticulous prerequisites of research protocols, which might not resemble clinical practices (283). Measurements in clinical trials would be undertaken at 2 or 3 intervals, and the cross-sectional variation between the groups on each of these scales would be correlated (76). To overcome some of the limitations of current research designs, a new framework was developed by the Medical Research Council to recognise and adopt appropriate methods for the evaluation of a variety of complex interventions (296). This framework suggested alternatives to theory-driven evaluation methods, such as cluster randomisation, a stepped-wedge design and a realist evaluation (296). However, the measurement tools designed for research purposes are highly likely to continue to be directed towards the measurement of the disease or the effectiveness of interventions rather than what is important to the patient (297).

In contrast to the research environment, the majority of healthcare providers in a clinical context interact with patients who have multiple comorbidities and who are of various ages, genders, levels of education or social statuses (298). In a clinical context, clinicians are more interested in examining the longitudinal within-subject changes in a singular dimension of interest (76). Usually, it is a partnership, communication or a mutual agreement between a clinician's experience/expertise and a patient's expectations/preferences that will determine the outcomes to be measured in a clinical context.

Clinicians in a research setting are more interested in developing measurement tools that examine overall changes between patients (294). When performing a measurement on a group level, it is common in a research setting to randomise patients into different groups and average the results to reduce the systematic bias and random errors that are associated with the process of measurement. This is not attainable when using the same measurement tool on the individual level (299). In contrast, clinicians in a clinical context are more interested in the within-patient changes over time (289,294,297,299).

Measurements in clinical contexts are often on an individual level, while in research, group measurements are usually needed. Measurements on the individual level (i.e., a sample of 1) require a higher level of specificity, sensitivity and responsiveness to overcome measurement errors, which could affect a scale's validity and lead to low scale reliability (289,300,301). Studies have also shown that some clinicians might struggle to apply research-designed measures to clinical practice due to limited knowledge and expertise in the field of measurement theories (283,302).

There are at least four important properties that should be fulfilled in a scale to ensure that it is suitable to translate clinical observations into meaningful scientific data that would ultimately contribute to solving clinical problems and providing EBP in clinical contexts (76,289). Firstly, a scale should produce the same results when repeated in the same population (reliable). Secondly, a scale must be able to measure what it is intended to measure (valid). Thirdly, a scale must be able to detect an important change, even if that change is small (sensitivity/responsive). Fourthly, the intended audience must be able to comprehend the magnitude of the effect (interpretable). This research programme proposes that satisfying these requirements of a theory-driven measurement tool that measures constructs important to individuals with LBP will ensure the collection of data that inform clinical decisions in a clinical context at the individual level and that it be aggregated to inform decisions on the group level (i.e., managers, policymakers or commissioners). These measurement properties will be discussed in detail in the following subsections.

6.2.1 A scale should produce the same results when repeated in the same population

The process of measurement might be associated with systematic and random errors (303). The nature of the pain or functional status makes the processes of measurement

rarely perfectly reliable. In reality, it is difficult to calculate errors associated with the measurement of pain or function because they are unstable subjective phenomena; therefore, the measurement of both constructs and the associated measurement errors are difficult and rarely reliable.

In a research environment, measuring changes on a group level will significantly reduce random errors by averaging the test scores, assuming that random errors are normally distributed and would eventually cancel each other out, making the average score a good estimate of the true score. However, this is not the case if the same measurement is performed at the individual level. A physiotherapist working in a clinical context would deal with one patient at a time, and instead of performing cross-sectional measurements on a group of patients, he/she would perform longitudinal measurements on the same patient. This might eliminate systematic errors; however, random errors would have a significant impact on the scores if the scale was poorly developed (304,305).

The usefulness of measurements in clinical contexts depends on the extent to which healthcare providers can rely on scores as accurate and meaningful indicators of pain or function. A scale that is highly inconsistent cannot generate meaningful measurements (295). A reliable scale should produce relatively consistent responses over time given the subjectivity and instability of the attribute being measured, providing it remains consistent. This first characteristic is fundamental to all other aspects of measurement (295). This is because without it, clinicians cannot have confidence in the data collected and would be unable to make rational conclusions from the data or clinical decisions regarding whether or not to continue therapy or to stop physiotherapy and refer the patient to other services or interventions that might induce recovery. An appropriate scaling method, such as the Guttman scaling method [Subsection 5.4.3], might help to minimise the impact of errors on the process of the measurement at the individual level and might enhance the reliability (271,306).

6.2.2 A scale must be able to measure what it is intended to measure

Scales that are intended for use in clinical contexts must contain questions that are relevant to the context (288). It is not logical to ask people about the effort required to climb hills where there are no hills. If a scale is able to measure what is intended to be measured, then it is considered a valid scale. Validity implies that a scale is relatively free from measurement errors or has a small margin of measurement errors (295). The

presence of any measurement errors might cause a scale's scores to be invalid representations of the attribute being measured. This characteristic is fundamental in drawing inferences from collected data and determining how scores of a scale can be used in clinical contexts and in the decision-making process (295).

As indicated in Chapter 4, pain intensity is a subjective experience that can only be quantified through self-reporting, which presents a different set of issues. For example, patients may be asked to rate their pain by placing a mark on a 10 centimetre straight line over a page of paper, so different respondents place different marks to show how much pain they are experiencing at a particular time. The line itself in this type of scale does not specifically represent any of the different dimensions of pain [Chapter 4]. Participants might feel confused and rate the pain impact on their life, report only the pain intensity or any combination of these different dimensions of pain. Clinicians cannot guarantee that these marks actually represent any of the dimensions of pain. In other words, the problems are that the clinician cannot falsify patients' ratings nor can they verify that this pain scale actually reflects the different dimensions of pain.

Additional problems will also appear in the longitudinal measurement of pain. This is because there are no clear units of the measurement of pain to reflect upon if a patient's symptoms have actually improved, did not change or have deteriorated. It is well-documented that pain is not a fixed phenomenon, which means the same patient might report different pain intensities or pain impact throughout the day; therefore, the timing of the measurement will play a major role in the measurement process. In comparison to pain, for physical functioning, which is an observable construct and is affected by LBP, patients can report their problems, and physiotherapists can observe the problems. Therefore, this thesis supports the adoption of this construct in the measurement of the impact of LBP.

6.2.3 A scale must be able to detect an important change even if that change is small

As mentioned previously, clinicians in a research environment may be more interested in calculating the difference between groups. Thus, the scores generated from clinical trial measures are often presented as means. While this may be helpful in testing one intervention against another in groups of patients, it is of less value in clinical environments (294). It is difficult to evaluate the effectiveness of physiotherapy at the

individual level using means because the point in time in which the patient's health status changed cannot be identified. A clinical trial is the best-known approach to examine whether an intervention works, but it is debatably the worst approach to examine who benefits from an intervention (307).

To clarify the confusion involving the interpretation of means in clinical trials, significance testing through the use of a p-value cut-off point of 0.05 was introduced by statisticians (308). This resulted in studies' scores being either statistically significant or insignificant. Even though this cut-off point objectified clinical trials' outcomes, adhering to such a rigid p-value can lead to serious consequences. Firstly, a potentially important clinical difference observed in trials can be represented as insignificant and therefore be unfairly disregarded as a result of having a small sample size (type 2 error). Secondly, a trivial difference in measurements can be proved statistically significant by increasing the number of individuals in a trial. Such a small difference may be irrelevant to patients or clinicians. Therefore, a statistically significant difference does not necessarily infer a clinical significance. To examine clinical significance, the concept of a minimal clinically important difference (MCID) was proposed by Kirshner and Guyatt (76) in 1985. The MCID is defined as "*the smallest difference in a score of a domain of interest that patients perceive to be beneficial and that would mandate a change in their management in the absence of troublesome side effects and excessive costs*" (309), p. 408.

It is clear from this definition that MCID offers a threshold above which an outcome is deemed as important by the patient. This threshold must also exceed the errors threshold of measurement to consider it a true change in the patient's health status and not the result of a measurement error (267,289).

There are three well-known techniques to calculate or estimate the MCID, which are distribution-based methods, anchor-based methods and the nominal group technique (289). The distribution-based methods are derived from statistical measures of the spread of data, such as standard deviation, standard error of the mean and effect size, which is based on standard deviation (289). These methods have two major limitations. Firstly, estimates of variability will differ from one study to another (289). For example, if a clinician selected the between-patient standard deviation, they have to confront its dependence on the heterogeneity of the sample under study. If an extremely heterogeneous sample (which is typical in clinical contexts) is enrolled in a trial, the significant effect may be small in terms of the between-individual standard deviation and

therefore judged trivial. However, the same effect size in an extremely homogeneous sample (which is typical in a research environment) in a trial may be large in terms of the between-individual standard deviation and therefore considered as significantly important. The real impact of the change stays the same, but the interpretation varies drastically. This leads to the second limitation in deciding whether or not the magnitude of the intervention effect is worth the risks and costs. A clinician who knows that the effect is a 0.4 standard deviation unit will be unable to use this number to inform clinical decisions. The unit does not carry any intuitive meaning to clinicians. Furthermore, methods based on the effect size assume that all patients change in the same direction. This might lead to imprecision if individuals who did not improve are included in the summary statistics (290).

The anchor based method establishes whether or not the patient has changed after treatment compared to the baseline according to the patient's own experiences. The anchor method is not suitable for conditions in which most patients will improve and few will remain unchanged, such as individuals with LBP (308).

The nominal group technique relies on a panel of experts who possess scientific or clinical knowledge to reach a consensus regarding the MCID. The expert panel is asked to provide their best estimate of the MCID. The opinion of the majority is considered during the period of the scale construction (310-312). Currently, there is no consensus on one right method to determine the MCID. It is important to note that MCID varies according to the health conditions and the starting states. The perception of change in a state, such as physical functioning, derives its significance and meaning in comparison to the starting state as much as any other referent (290). For instance, an individual who started at a low level of function on a scale and experienced a degree of change along the dimensions being measured might perceive the change as clinically significant. However, another individual who started with much higher physical abilities might view the same size change as a trivial improvement and would need a much larger change to consider it clinically significant. Therefore, the sensitivity or responsiveness of the scale still mandates asking the question of whether the same amount of change in an underlying dimension is clinically significant at all levels or a function of the level at which a person starts.

MCID is significantly important to determine whether or not a measurement tool is sensitive or responsive to change. Clinicians should be cautious not to confuse sensitivity

with responsiveness. Sensitivity refers to "*the ability of an instrument to measure change in a state regardless of whether it is relevant or meaningful to the decision maker. A test may be sensitive to a state or a diagnosis, but whether it is meaningful or important cannot be deduced from this property alone*" (290), p. 1185. However, responsiveness refers to "*the ability of an instrument to measure a meaningful or clinically important change in a clinical state*" (290), p. 1185. This difference between the two terminologies will be addressed in more detail in the next subsection. Clinical knowledge may be more suitable to determine the MCID than the statistical tests because statistical tests provide data that requires further interpretations and analyses to transform these data into information. On the other hand, clinical knowledge provides direct information about the pattern of recovery and the various stages of recovery. Therefore, this thesis supports the use of the nominal group technique to determine the MCID in outcome measures developed for use in a clinical context.

6.2.4 Intended audience must be able to comprehend the magnitude of the treatment effect

In the last century, the scientific community argued that the question to which clinicians must find an answer is not 'should it work' but 'does it work' (307). In 2015, clinicians have to advance one step further and ask 'does it work for this patient' instead of 'does it work for most patients'. Therapists need a *responsive* system to explore what works for whom. Unfortunately, many measurement tools are 'sensitive' to changes but not 'responsive'. It is unclear whether these scales (generic or condition-specific) capture meaningful changes at the individual level. This research programme identified a number of factors that might affect a clinician's ability to understand the magnitude of a treatment effect.

Firstly, the high variability in individual perceptions and the qualitative nature of both pain and function implies that presenting only the mean value is both meaningless and unscientific (292). In other words, mean values do not reflect the health status of any individual in the group.

Secondly, clinicians need to consider that two individuals with the same injury who are treated in the same way might see changes in their health status in different ways (267). Therefore, a desired outcome, such as restoring physical function or pain reduction, may be perceived differently by different patients based on their personal and disease-related

characteristics as well as their health-concerned beliefs, attitudes and expectations.

Thirdly, clinicians rarely consider that individuals with health conditions are affected by their social environment (289). Therefore, clinicians working in clinical contexts must consider the complexity of social problems within which clinical problems arise and must be solved. Measurement tools should assist clinicians in interpreting personally unique patterns of illness instead of recognising generalised patterns of disease. This can be achieved by understanding the different dimensions of a patient's disease-related quality of life and their perceived state of well-being. This holistic bio-psychosocial approach views patients as people instead of cases, which can empower people to live with incurable illnesses, such as LBP.

Fourthly, clinicians should understand that the path from scientific law to scientific measurement can rarely be travelled in the reverse direction (313), which suggests that clinical and theoretical knowledge as well as measurement theories and scaling methods are preliminaries in measurements that are scientifically useful. It also implies that therapists may not be able to generate/build concrete theories/laws about the attribute being measured from individual measurements taken during clinical practices.

As discussed previously, many scales in the field of physiotherapy are nominal and ordinal level scales. The assignment of numerals to categories produces problems because clinicians might assume that such numerals represent numbers or magnitudes instead of orders. This is important because data generated by nominal and ordinal scales cannot be manipulated with any of the fundamental operations of algebra (257).

Fifthly, adherence to the theoretical conditions of numerical assignment will ensure that scores generated by a measurement tool are informative in clinical contexts. These assumptions and conditions were discussed in detail in the previous section; however, a short list will be presented in Box 6.1. The points in Box 6.1 were extracted from a study by Michels (257) addressing the theoretical requirements of a measurement in the physiotherapy field.

Finally, most studies on the psychometric properties of scales focused on providing compelling evidence for validity and reliability; however, less attention is directed towards responsiveness (314).

Box 6.1: The theoretical conditions of numerical assignments to observations

1. There is a rule for making numerical assignments.
2. The rule is determinative in the sense that the same numerals would always be assigned to the same things under the same conditions.
3. The rule is non-degenerate in the sense that it allows for the possibility of assigning different numerals to different things or to the same things under different conditions.
4. Categories or units on the scale are mutually exclusive and exhaustive.
5. Any object that occurs in the order of the quantity represented on the scale must be measurable by the procedure for measuring on that scale.
6. Any object that is measurable on the scale must occur in the order of the quantity represented on that scale.
7. Objects measurable on the scale that are arranged in the order of their numerical assignments are thereby arranged in the order of the quantity.

6.3 Summary

This section proposes that a valid, reliable and responsive outcome measure will not only influence clinical decisions but will also help in allocating scarce health resources without compromising patients' care. In a clinical context, it is important to relate clinical significance to the goal of therapy and the construct that the clinical significance reflects. The theoretical knowledge generated from previous chapters will be used in a critical review of six of the most commonly used scales in the management of LBP in the next chapter.

Chapter 7: A critical review of existing LBP outcome measures

Key point in Chapter 7:

- There are major issues in the current most commonly used LBP outcome measures, such as a lack of conceptual models, double and triple direct questions, the absence of a clear unit of measurement, a lack of coverage of goals important to individuals with LBP and floor and ceiling effects. Therefore, a new measurement tool capable of measuring patient-centred changes at the individual level in clinical contexts and the group level in research contexts might be a useful addition.

7.1 Introduction

This chapter aims to answer the following question: are current pain and back-disability measures appropriate and adequate for the measurement of changes in individuals with LBP in clinical practices, or is a new measurement tool required? Answering this requires critically appraising current measures with an appropriate evaluation checklist. The Consensus-based Standards for the selection of the health status Measurement Instruments (COSMIN) checklist (315) was used to evaluate the measurement properties of six LBP scales (Figure 7.1). The outcome measures reviewed in this chapter were selected because they are the most commonly used in the LBP field (209,210,225,316) and the only ones translated into the Arabic language (9). This consensus-based checklist was specifically developed by healthcare experts to evaluate the methodological quality of studies on measurement properties.

Figure 7.1: COSMIN taxonomy of the relationships of measurement properties

From Mokkink et al. (315), HR-PRO: Health-Related Patient Reported Outcome measure

Box 7.1 shows six questions that were extracted from the findings of the previous chapters of this thesis. These novel questions were added to the checklist because the COSMIN checklist was designed to evaluate the measurement properties, but it did not include questions related to the process of their development; therefore, the questions in Box 7.1 are an important addition to the COSMIN checklist.

Box 7.1: List of questions to guide the critical appraisal of LBP outcome measures

1) What is the dimension of interest in this scale?
2) What is the purpose of this scale?
3) Have the logical requirements of the measurement theory been satisfied?
4) What is the scale of measurement?
5) What is the rule for making numerical assignments?
6) What is the unit of measurement in this scale?

The measurement tools in the healthcare context are divided into generic and condition-specific outcome measures. Condition-specific outcome measures pertaining to LBP are mainly used to examine the symptoms and the impact of LBP on individuals' lives (317). The preference to use one type of measures or a combination depends on the purpose of the measurement and the period of evaluation (318). Researchers interested in comparing the impact of different conditions on peoples' lives might opt to use a generic outcome measure, such as the Short Form-36 (319), for a policy directive perspective (11); however, generic measures include items that do not necessarily reflect what is important to different patients with a specific condition in a clinical context. Patients might choose not to complete questions that are not relevant to them. This might limit the use of generic measures in a clinical context. In contrast to generic measures, condition-specific measures directly relate to what patients consider important to them, such as restoring function, reducing pain intensity, or improving social interaction (211,320). Thus, the purposes of the following sub-sections are:

1. Review the concepts within six of the most commonly used condition-specific questionnaires that examine back-specific disability (321) and pain intensity (225,322).
2. Critically appraise the development of each of these questionnaires based on the measurement theory.
3. To examine the ability to understand and interpret scores or percentages obtained by each of these patient-oriented scales.

7.2 Pain scales

7.2.1 The visual analogue scale

The visual analogue scale (VAS) is a measure that uses a 100 millimetre line to enable respondents to rate their pain intensity (323). This scale is frequently marked on one end

as *no pain* and the other end as *pain as bad as it could possibly be* (226,324). The VAS is easy to administer and has many response categories (227). Therapists' might ask patients to place a mark on this line to represent their current perception of a particular phenomenon regarding pain intensity or pain impact on a physical activity, and then therapists measure the length between the 'no pain's' mark to the patient's mark in millimetres using a ruler (226). However, the process of the interpretation of scores is not simple. Many studies report various limitations associated with the administration and interpretation of the VAS (225,226,324-330). For example, the VAS lacks a theoretical foundation that relates units of measurement to clinical meanings (325,326). Due to this lack of clarity in the units of measurement, the patients (and therapists) are obligated to guess the meaning of the mark on the VAS.

The graphic rating scale is another form of the VAS that assigns marks, such as mild, moderate or severe, to specific intervals of 20 mm, for instance (226,281,331). Placing these marks at equal distances may not be appropriate for all patients because patients usually express pain in different ways while rating their pain using these marks on the VAS (332). Furthermore, a 20 mm change that is close to the lower end of the scale may not be the same as a 20 mm change that is close to the upper end of the scale (331). Scott and Huskisson (323) and Aicher (281) showed that the scores' distributions are affected by the allocation of markers on the VAS; if these markers were spread through the entire length of the line, it might produce a more uniform data distribution compared to placing markers on even intervals on the VAS.

The graphic line orientation can also be one of the VAS's limitations during the administration process. Ogon (205) showed that data obtained using the VAS in the horizontal graphic orientation was normally distributed, but when the same scale was administered using the vertical graphic orientation, such as in the EQ-5D-5L (333), the data obtained was not normally distributed. This might mean that graphic orientations can lead to changes in the distribution of ratings obtained using the VAS; however, a Chinese study showed less error using the vertical graphic orientation of the VAS scale compared to the horizontal scale (334). Another study by Scott and Huskisson (335) found a 7% disagreement between two sets of scores when researchers presented the VAS in a vertical orientation compared to the horizontal graphic orientation. This disagreement occurred because the ratings obtained using the horizontal scale tended to be slightly lower than the vertically obtained results from the same subjects at the same time. The reason for

this may be cultural, as the Chinese population usually reads symbols in a vertically, while the English population reads from left to right. However, Herr and Mobily (336) reported that elderly individuals prefer to report pain intensity levels using the vertical VAS. The authors suggested that elderly people find it easier to understand; however, findings obtained from the previous studies may not be generalisable as participants within this study were purposively recruited and were highly educated, which might indicate selection bias. Regardless of the aforementioned limitations, it is highly recommended to keep the graphical orientation constant for any scale during testing and follow ups. This is important to induce a degree of consistency and to potentially control orientation related errors.

It is also important to examine the data distribution because this will determine the statistical tests employed (226). Many studies hypothesized that the VAS has ratio properties, and the data obtained are normally distributed to allow the use of parametric tests, though this may not always be the case, especially with a small sample (226). Studies showed that data obtained from patients who have psychological problems associated with their health conditions or data obtained from individuals with severe pain might produce responses that are not normally distributed, which requires non-parametric tests (205,208). Furthermore, it was reported that old people have more difficulties in understanding the concept of the VAS, which may be due to difficulties in quantifying a subjective latent phenomenon as pain (208).

Although studies have suggested that the VAS is a valid and reliable measure in a research setting, evidence is lacking regarding the examination of psychometric properties in a clinical context. Rosier (337) suggested that if a constant stimulation, such as a visual stimulation, was applied to a group of patients on different occasions to avoid the summation effect of repeated measurement, the ratings obtained using the VAS should be the same on all occasions. However, this study showed that the pain ratings varied over time despite the fact that the physical stimuli were consistent.

The VAS does not have a clear unit of measurement that represents the perceived pain intensity. There is no evidence to suggest that patients will interpret the same amount of change at any point on the scale in the same way (331). This lack of clarity and precision of what exactly is being measured may be a source of measurement errors. Therefore, there is no evidence to support the use of the VAS for decision-making in a clinical context. Table 7.1 presents a summary of the critical appraisal of three pain scales.

Table 7.1: A summary for the critical review of the measurement properties of the Visual Analogue Scale (VAS), Verbal Rating Scale (VRS) and Numeric Rating Scale (NRS)

Quality criteria	Visual analogue scale	Verbal rating scale	Numeric rating scale
What is the dimension of interest in this scale?	Multiple uses including pain intensity	Multiple uses including pain intensity	Multiple uses including pain intensity
What is the purpose of this scale?	VAS is not discriminative, predictive or evaluation instrument; however, this scale is frequently used to quantify pain intensity.	VRS is not discriminative, predictive or evaluation instrument; however, this scale is frequently used to quantify pain intensity	NRS is not discriminative, predictive or evaluation instrument; however, this scale is frequently used to quantify pain intensity
Are the logical requirements of measurement theory satisfied?	No, VAS has unclear unit of measurement and the same score could be assigned to different pain traits.	No, VRS has unclear unit of measurement and the same response choice could be assigned to different pain traits.	No, NRS has unclear unit of measurement and the same score could be assigned to different pain traits.
What is the scale of measurement?	Ratio (Not valid)	Ordinal	Ratio (Not valid)
What is the rule for making numerical assignments?	Unclear, an individual with LBP places a mark on a 100 mm line to represent their perception of pain intensity; however, the score cannot be falsified	Unclear, an individual with LBP selects one of the available response choices; however, the score cannot be falsified	Unclear, an individual with LBP selects one of the available response choices (0 -10); however, the score cannot be falsified
What is the unit of measurement in this scale?	1 millimetre; however, a one unit of change does not represent neither a statistical nor a clinical significant change	1 response choice; however, a one unit of change does not represent neither a statistical nor a clinical significant change	1 response choice; however, a one unit of change does not represent neither a statistical nor a clinical significant change
Reliability	▪ Inter-rater: k = 0.61 § ▪ Intra-rater: k = 0.70 §	▪ Inter-rater: k = 0.54 § ▪ Intra-rater: k =0.65 §	▪ Inter-rater: k = 0.48 § ▪ Intra-rater: k = 0.59 §
Internal consistency	N/A	N/A	N/A
Measurement error	Standard Error: 15mm ¥	N/A	Standard Error: 1.02 point ¥
Content validity	No, the response system is not an adequate reflection of the construct to be measured	No, the response system is not an adequate reflection of the construct to be measured	No, the response system is not an adequate reflection of the construct to be measured
Face validity	No, the VAS does not look as an adequate reflection of the construct to be measured	Yes (but depends on wording)	No, the VAS does not look as an adequate reflection of the construct to be measured
Construct validity	r = 0.84 - 0.93 (NRS) ¤	Lack of information about the slope of the regression line of changes in pain perception means that the degree of agreement between the VRS and other pain scales cannot be established.	r = 0.84 - 0.93 (VAS) ¤

Structural validity	No, the VAS represents an arithmetic curve and the perception of pain intensity follow an exponential curve ψ		No, the NRS represents an arithmetic curve and pain intensity follow an exponential curve
Cross-cultural validity	Not established in the Arabic language	Not established in the Arabic language	Not established in the Arabic language
Criterion validity	N/A	N/A	N/A
Sensitivity	ES: 0.77 Φ MDC: 18-19 mm ¥	ES: 0.76 Φ AUC: 0.61 Ω	ES: 0.86 Φ MDC: 2 points Ж AUC: 0.72 (0.62, 0.81) and 0.92 (0.86, 0.97); 1 and 4-week follow-up, respectively Ж MCID: 2.2 and 1.5 points, respectively Ж
Interpretability	No guidance of how to interpret scores	No guidance of how to interpret scores	No guidance of how to interpret scores

The information in Table 7.1 were extracted mainly from Williamson et al. (208)

ICC: Interclass coefficient, r: Spearman's r coefficient, k: Kappa coefficient, N/A: Not applicable, MDC: Minimum Detectable Change, ES: Effect size, AUC: Area Under the Curve, MCID: Minimum Clinically Important Difference

§ From Lara-Mun˜oz et al. (328) ¥ From Hagg et al. (211) Ж From Childs et al. (338) Ж From Sindhu et al. (339) ψ From Fechner (170)

Φ From Bolton and Wilkinson (340) Ω From Chien et al. (341)

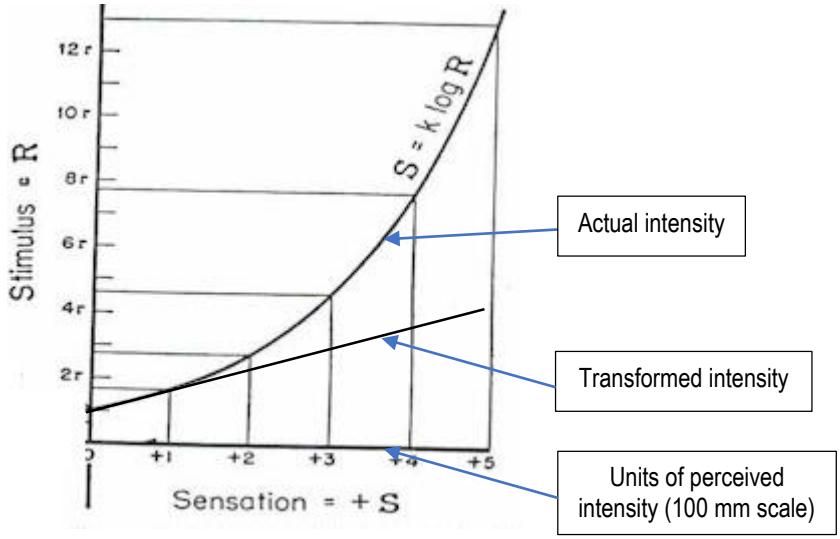
Despite the fact that the scaling method used in the VAS generates ratio level data, the translating medium in the VAS is the patient perception of pain, which can be described using ordinal level data because the mind is known to convert the intensity of pain to a logarithm of the intensity of the pain (170) according to the following equation:

Equation 7.1: Weber–Fechner law

Perceived pain intensity (S) = k log (actual intensity (R)) + Fechner constant (c)

Figure 7.2 shows a simple representation of the relationship between actual, transformed and perceived pain intensity.

Figure 7.2: A representation of the Weber–Fechner law



According to the Weber–Fechner law (170), a mark on a 100 mm scale is not a valid measurement of pain because the properties of the translating medium are ignored (342). Furthermore, the millimetres on the VAS have not been defined as units of actual pain intensity.

7.2.2 The verbal rating scale

The verbal rating scale (VRS) is a set of adjectives used in a hierarchical order to represent pain intensity levels (328). Most commonly, this scale is represented in four categories using the words ‘no pain at all’, ‘mild pain’, ‘moderate pain’ and ‘severe pain’ (227). Many studies report the ease of administration and scoring of this scale, and it can be administered in many formats and through different methods, such as verbally via a phone call or printed on paper (208,225,227,281). However, issues associated with this scale have been reported (208,225).

This scale is an ordinal scale, and it should follow the ordinal level of measurement devised by Steven (343). This means that mathematical operations, such as summation and subtraction, cannot be applied to ratings obtained using this scale despite assigning patients' responses to different numbers because the intervals between responses are not equal (208). This is important to understand at this stage because it has been suggested that parametric tests should not be used to test the psychometric properties of this scale if it measures qualitative attributes (227). It is also important to note that this scale limits patients' abilities to express pain from a personal perspective because the patient has to choose from the limited given options, which may be less representative of his/her own pain intensity level. This is important because many studies indicated that pain itself is a personal experience for each individual [Chapter 4]. Clinicians rely on patients to self-report their pain intensity levels, and by limiting the choices or categories on a measure, the report might not adequately reflect the individual patient's experience.

7.2.3 The numeric rating scale

The numeric rating scale (NRS) is an 11, 21 or 101 point scale in which one end of the scale may be marked as 'no pain at all' and the other end may be marked as 'pain as bad as it could be' (344). This scale could be administered graphically printed on paper or verbally via the phone (208,225).

The NRS is easy to administer and score (208,227); however, many studies report issues associated with the NRS, and a limited number of studies investigated the scale's psychometric properties (225). Thus, there is no adequate information regarding the data distribution, the minimal clinical change or the error of data obtained using the NRS (208,225). Many researchers consider the level of measurement in the NRS to be a ratio scale when it is in fact an ordinal scale because patients are assigning their perceptions of pain (a psychological phenomenon) to numerals and not to numbers (227). The process of the measurement of pain is subjective and qualitative in its nature rather than an arithmetic calculation. There are differences between patients regarding their perception of their problems, and the same numeral cannot be generalised or assumed to mean the same for different subjects (256). The NRS is affected by the same major limitations as the VAS. Therefore, the NRS is not a valid measurement of pain intensity.

The measurement units of the VAS, VRS and NRS are unclear (340). For example, the standard error of measurement of the VAS was reported to be 15 mm (211), and studies,

such as Landorfa and Radford (345), showed that the MCID in the VAS (9 mm) is inside the standard error of the measurement range. The answer to this question is important for the interpretation of scores and later on in the process of clinical decision-making (340). This is important because if the MCID is within the range of measurement errors, then it will be difficult to determine if this change is an important clinical change or the result of measurement errors. Clinicians must be cautious when interpreting VAS scores because it is well-documented in many studies that a change from 90 mm to 80 mm is not equal to a change from 20 mm to 10 mm (281).

7.3 Back-disability scales

There are many back-disability scales that examine the impact of LBP on people's abilities to carry out various activities (321). However, the Roland-Morris disability questionnaire (RMDQ), the Oswestry disability index (ODI) and the Quebec back pain disability scale (QBPDS) are three questionnaires most commonly used in clinical research and clinical settings to examine disabilities caused by LBP (209,210,321,346,347). These instruments have been researched extensively, and a summary of the psychometric properties for these tools is presented in Table 7.2.

7.3.1 Roland-Morris disability questionnaire

The developer of the RMDQ selected twenty-four items out of 136 items belonging to the Sickness Impact Profile to generate the RMDQ (274). There are different versions of the RMDQ (321). However, only the original version is recommended because different studies indicate that the original version of the RMDQ is valid, reliable and sensitive to changes in people with LBP (209,321). The RMDQ is considered to be short and simple to administer and is widely used to examine patients' levels of physical disabilities (270). The RMDQ includes items that represent the execution of functions and physical activities that may be affected by LBP. Activities such as housework, sleeping and mobility, dressing and getting help, appetite, irritability and pain severity are covered in the original RMDQ. The authors of the RMDQ likely selected these items because they describe activities affected by LBP. This was confirmed later in a study by Wang (210) in which items in this scale were linked to the ICF (Table 7.3). It can be clearly observed in Table 7.3 that the concepts in the RMDQ, ODI and QBPDS show some of the daily activities that are affected by LBP.

Table 7.2: A summary for the critical review of RMDQ, ODI and QBPDS

Quality criteria	Roland-Morris disability questionnaire	Oswestry disability index	Quebec back pain disability scale
What is the dimension of interest in this scale?	Social functioning, personal care, body functions, pain intensity and fear-avoidance behaviours [Ж]	Pain intensity, personal care, social functioning and physical functioning [Ж]	Physical functioning [Ж]
What is the purpose of this scale?	Evaluation instrument	Evaluation instrument	Evaluation instrument
What is the scale of measurement?	Nominal	Ordinal	Ordinal
What is the rule for making numerical assignments?	An individual with LBP selects (Yes/No) for each statement in the questionnaire	An individual with LBP selects one of the available response choices for each item in the scale	An individual with LBP selects one of the available response choices; however, the score cannot be falsified
What is the unit of measurement in this scale?	1 response choice; however, a one unit change does not represent neither a statistical nor a clinical significant change	1 response choice; however, a one unit change does not represent neither a statistical nor a clinical significant change	1 response choice; however, a one unit change does not represent neither a statistical nor a clinical significant change
Reliability	Intra-rater: ICC = .91 Same day test-retest [†]	Intra-rater: ICC= 0.94 (0.89 - 0.97); 95%[$]	Intra-rater: ICC= 0.92; 95% [Ѫ]
Internal consistency	0.83 [ψ]	0.83 [$]	0.96 [Ѫ]
Measurement error	SEM (95% CI) = 5.2 (4.1-6.4) [†]	SEM (95% CI) = 9 (7-12) [†]	SEM (95% CI) = 13.08 (10.54–17.47) [‡]
Content validity	No [Ѫ]	No [Ѫ]	Yes [Ѫ]
Face validity	No [Ѫ]	No [Ѫ]	Yes [Ѫ]
Construct validity	RMDQ and the SIP (r = .85) [Φ] RMDQ and QBPDS (r= 0.77) [Ѫ]	ODI and EQ5D baseline scores (r = 0.58) [£]	RMDQ and QBPDS (r= 0.77) [Ѫ]
Structural validity	No (Subsection 7.3.1)	No (Subsection 7.3.2)	No (Subsection 7.3.3)
Cross-cultural validity	Cross-culturally adapted to Arabic [¥]	Cross-culturally adapted to Arabic [β]	Cross-culturally adapted to Arabic [€]
Criterion validity	N/A	N/A	N/A
Sensitivity	SRM = 0.55 (95% CI = -0.54 to 1.64) [†] ROC = 0.77 (95% CI = 0.68 to 0.87) [†] MDC (95% CI) = 8.6 (6.7–10.6) [†] MCID = 6.56 points [Ω]	SRM = 0.52 (95% CI = - 0.51 to 1.56) [†] ROC = 0.78 (95% CI = 0.69 to 0.87) [†] MDC (95% CI) = 15 (11–19) [†] MCID = 12.8 (2.92 - 15.36) [§]	SRM = 0.49 (95% CI = - 0.47 to 1.44) [†] ROC = 0.74 (95% CI = 0.64 to 0.84) [†] MDC (95% CI) = 19 (14–24) [†] MCID = 15 points (sensitivity=82% [95% CI=70%–93%], specificity=83% [95% CI=67%–98%]).
Interpretability	No guidance of how to interpret scores	No guidance of how to interpret scores	No guidance of how to interpret scores

Ж Longo et al. (321) *† Davidson and Keating (270)* *ψ Mousavi et al. (348)* *Φ Deyo (349)* *Ѫ Kopec et al. (279)* *Ω Jordan et al. (350)*
§ Copay et al. (351) *$ Grotle et al. (352)* *£ Johnsen et al. (353)* *¥ Bejia et al. (354)* *β Algarni et al. (355)* *€ Altaim and Littlewood (96)*
‡ Fritz and Irrgang (356) *SEM: Standard Error of Measurement* *SRM: Standard Response Mean* *ROC: Receiver Operating Characteristic*
MDC: Minimal Detectable Change *N/A: Not applicable*

Table 7.3: Linking concepts in the ODI, RMDQ and QBPDS to the ICF

Scale	ODI	RMDQ	QBPDS
ICFDH codes	b134 (Sleep function)*, b280 (Sensation of Pain), d230 (Carrying out daily routine)**, d4153 (Maintaining a sitting position)**, d4154 (Maintaining a standing position)*, d430 (Lifting and carrying objects)**, d4500 (Walking short distances)*, d4501 (Walking long distances)**, d5 (Self-care), d7702 (Sexual relationship), d9 (Community, social and civic life), d920 (Recreation and leisure), e1101 (Drugs), e1150 (General products and technology for personal use in daily living), e1201 (Assistive products and technology for personal indoor and outdoor mobility and transportation),	b1302 (Appetite), b134 (Sleep function)*, b152 (Emotional function), b28013 (Pain in back), d230 (Carrying out daily routine)**, d410 (Changing basic body position)**, d4102 (Kneeling), d4105 (Bending)**, d4106 (Shifting the body's centre of gravity), d4154 (Maintaining a standing position)*, d450 (Walking), d4500 (Walking short distances)*, d4551 (Climbing)**, d465 (Moving around using equipment), d540 (Dressing), d5402 (Putting on footwear)**, d570 (Looking after one's health), d845 (Acquiring, keeping and terminating a job), d850 (Remunerative employment), e3 (Support and relationship),	b134 (Sleep function)*, d2100 (Undertaking a simple tasks), d410 (Changing basic body position)**, d4105 (Bending)**, d4153 (Maintaining a sitting position)**, d4154 (Maintaining a standing position)*, d430 (Lifting and carrying objects)**, d4450 (Pulling), d4451 (Pushing), d4454 (Throwing), d4500 (Walking short distances)*, d4501 (Walking long distances)**, d4551 (Climbing)**, d4552 (Running), d470 (Using transportation), d5402 (Putting on footwear)**, d640 (Doing housework),

Adapted from Wang (210)
ODI: Oswestry disability index; RMDQ: Roland-Morris disability questionnaire; QBPDS: Quebec back pain disability scale; ICF: international classification of function, disability and health; ICC: Interclass correlation coefficient; AUC: Area under curve.
**: The ICF code is shared between the ODI, RMDQ and QDBS.*
***: ICF code is shared between at least two scales*

7.3.2 Oswestry disability index

The ODI was developed by clinicians (357). It is unclear how the questions in the ODI were selected or generated to be tested on people who suffer from LBP; however, Kopec *et al.* (279) suggested that clinicians used a 'common sense' approach for item selection based on intuition rather than on the empirical analysis of a large sample of potential items. It does not appear that any qualitative study was undertaken to develop the ODI, which suggests that questions were selected from different questionnaires that assessed the impact of LBP on the activities of daily living (321). The original ODI included ten sections of questions that covered twenty-four concepts (210). These concepts belong to three ICF categories (Table 7.3): body function, activity and participation and environmental factors (210). These sections include concepts related to pain intensity, sleeping, sitting and standing, walking, lifting, social and sexual abilities, personal care

and travelling (321). Each section includes six statements that range from the best to worst scenarios. However, the process of calculating the overall score is inappropriate because it violates the rules of the ordinal level of measurement [Chapter 5]. The numerals from each section are added to give a total percentage of disability using the following equation (Equation 7.1):

Equation 7.2: Calculating the Oswestry disability index overall disability percentage

Overall disability level= ((patient's score) / (number of sections completed X 5)) X 100

Thus, an incomplete section is omitted from the calculation, and the implication is that the sensitivity of the scale could be compromised (295). Patients are classified on the ODI as minimally disabled (0-20%), moderately disabled (21-40%), severely disabled (41-60%) and crippled (61-80%). Patients with a score between 81-100% are considered to be either bed-bound or exaggerating their symptoms, which may or may not be true from a patient's reality or viewpoint (357).

There are different versions of the ODI, and some studies have removed the sex life section and replaced it with either a changing degree of pain section or an employment/homemaking section (321). Furthermore, one version of the ODI modified by the American Academy of Orthopaedic Surgeons completely omits sections 1, 8 and 9 (358). Moreover, statements in each section within each version of the ODI have also been changed (321). It is not clear whether or not omitting sections of the ODI might alter its psychometric properties or decrease its sensitivity. However, the different versions of the ODI aim to measure the same concepts but with different wording. Only version 2.0 specifies the recall period as 'today'. It is logical to assume that longer periods of recall might lead to recall bias given the instability of the attributes being measured over time (321).

7.3.3 Quebec back pain disability scale

Studies describing the development and reporting of the psychometric characteristics of the QBPDS were published by Kopec *et al.* in 1996 and 1995, respectively (278,279). Some amendments were made in relation to the scale's format and the wording of some of the indicators to produce the final version of the scale (279). The QBPDS includes twenty items that were selected out of more than forty-eight items identified by patients and healthcare professionals who participated in a qualitative study (278,279). This approach to the development of an outcome measure can make the scale relevant to the

intended population or suitable for clinical practice (23,24). However, the qualitative study was one part in a doctoral thesis, and the developer of the QBPDS did not publish this qualitative study in a peer-reviewed journal (274).

Twenty items were selected from a pool of data using a factor analysis to be tested with ambulatory LBP patients with different disability levels (356). These items represent basic daily tasks that patients with LBP might perceive as challenging to perform (209). Patients are instructed to rate the difficulty they face in performing the activities on the same day they visited the clinic (209). A 6-point Likert scale ranging from 0 to 5 was used with each indicator in the QBPDS to indicate the level of difficulty. It is not clear why the authors of the QBPDS selected this response system. Physical functioning is considered to be an observable phenomenon. However, the response choices in the Likert scale are unobservable and consequently unfalsifiable, which make them difficult to understand or to be applied to clinical decisions (359). Furthermore, the authors of this scale indicated that the assumptions of the Item Response Theory were followed; however, it is not clear how the different choices in the response system met the requirements of the Guttman scale [Chapter 5].

The RMDQ, ODI and QDS are freely available and permission is not required to use them in clinical practice or to reproduce them for clinical research (209,270,346). Furthermore, these three scales can be completed within ten minutes with no more than five minutes required to calculate the overall score for LBP back-related disability (270). However, there are issues associated with the content of these scales (Table 7.2). Studies have reported that the ODI contains items that are challenging to use with patients who are severely affected by LBP (209,270). This is known as the floor effect, and it makes the ODI more sensitive for use with people who are mildly or moderately affected by LBP (270,346). Compared with the ODI, the RMDQ has a ceiling effect, which makes it more sensitive for patients with more persistent and severe disabilities and less sensitive to mild conditions (209,270,360). Patients tend to leave some sections in the ODI and the RMDQ incomplete, especially those related to their sexual lives (139,209,270). Incomplete sections might reduce the sensitivity level of the scale. Scoring the RMDQ does not include an abstinence option (209). Thus, if patients choose not to answer an item that is irrelevant to them, clinicians might not notice this omission and assume that the patient does not have any problem that is related to this item and continue to fix the denominator as twenty-four [24 questions in the scale] (321). This might lead later on to a problem in

interpreting the overall score of disability level (209).

Regarding the ICF, studies show that the concepts within these scales are fully linked to the ICF (210). The ODI and the RMDQ include different dimensions, such as pain impact and physical disability (Table 7.3). However, there are many issues associated with the measurement of these concepts. For example, each question within the ODI aims to measure concepts from the body function, activity and participation components at the same time; this problem is known as a double question (210,321). This is a problem because a double question forces the respondent to rate two independent concepts on one response system, which might cause confusion. Furthermore, section seven in the ODI aims to measure activity and participation, body functions and environmental components simultaneously. These double or triple direct questions that simultaneously touch upon more than one concept can be a source of confusion for patients who are rating themselves due to a lack of clarity and uncertainty of what exactly is being measured (321). This lack of understanding of what exactly is being measured might lead to a user error, a problem also reported in the RMDQ (361). These double or triple direct questions can be a source of an overlap of concepts in a self-reported questionnaire and might lead to an unnecessarily lengthy questionnaire that asks patients to rate the same concept many times. Therefore, therapists and researchers might misunderstand this overlap in the ODI or the RMDQ, which hinders the appropriate use of these tools and adversely affects their validity.

Conversely, the QBPDS contains questions that measure concepts related to activity and participation in more detail (210). The questions in the QBPDS focus on examining various aspects of mobility (209,210). However, some patients indicated that some items in the QBPDS lack precision and that the choice between response 0 and 1 and between 4 and 5 is sometimes difficult (209). Furthermore, some patients said that items, such as ‘throwing a ball’, were not relevant to them (209).

Although many healthcare providers recognise the importance of these measurement tools, they face many difficulties in interpreting the changes in scores that occur following therapy (211,361,362). Clinicians need to interpret this information for service improvement and to make clinical decisions (320). Many studies show that back-specific disability instruments include items that are sensitive to change (209,270,321). However, interpreting these changes is a totally separate concept that requires close attention and sometimes caution (209). This problem may be related to the fact that the response system in these questionnaires does not represent a recovery pattern, and the changes between the response choices do not represent a clinically significant change. Items in these back-specific disability scales are not weighted equally, and the total score is calculated by adding the scores of all sections. There are no specific instructions in the case of omission or failure to answer irrelevant questions (209,321). This might significantly affect the clinicians' abilities to use these scales in clinical settings due to the difficulties that they face in interpreting the scores.

The same overall score of a disability level can be interpreted in many ways. This kind of uncertainty can be challenging and might lead to misunderstanding and confusion for both patients and clinicians. For example, a 10 unit reduction in a QBPDS score might mean a clinically significant change in a patient's health status. However, this might not always be the case as these ten units could be the result of a one-unit change (a trivial change) in ten questions that measures the same concept, such as a patient's ability to move the upper limbs while holding the trunk bent forward (211). Another interpretation could be that patients have five units of change in two different activities (a significant change), which are important to the patient, such as sitting down or standing for a long period of time. Hagg et al. (211) showed that the ODI and other scales indicated an overall improvement in patients' physical ability following different surgical treatments. There was no statistically significant difference between the different groups who underwent different surgical procedures. However, a close examination of individual items revealed that following surgical intervention, improvements were noted in pain intensity, sexual function, ability to sleep and psychological irritability. Major pre-treatment problems, such as the ability to sit, stand or lift weights, did not improve more than other functions, which indicates noticeable disabilities in these physical activities even after surgical intervention.

7.4 Summary

Pain and back-disability measurement tools are two types of condition-specific instruments that are well-researched and widely used in the literature of spine care. However, there are issues associated with the current most commonly used measurement tools. Firstly, it is unclear how items included within some of these questionnaires have been selected or developed to be tested with patients, such as individuals with LBP. Furthermore, it seems that the condition-specific instruments reviewed in this section do not adhere to the rules of the measurement theory discussed in Chapter 5 of this thesis. Different studies showed that some of these instruments include valid indicators or questions that reflect what is important to those who suffer from LBP. However, many research papers report that the response systems in these questionnaires are problematic.

This critical review showed that some of the questions in the current LBP pain or back-disability scales aim to measure more than one concept simultaneously. This leads to misunderstanding and confusion regarding what is actually being measured. Although each question in the QBPDS aims to measure one concept, there is an imbalance between the activities included in the scale. It appears that ten questions in the QBPDS examine patients' abilities to move their upper limbs while they bend their trunk forward, which could lead to overrepresentation bias as there is more emphasis on certain activities than others important to people with LBP, such as lifting and maintaining a sitting or standing position. This would suggest that a new measurement tool capable of measuring patient-centred changes at the level of the individual in clinical and research contexts would be a useful addition. The following chapter in the second phase discusses a method identified in the healthcare literature that was used to develop appropriate outcome measures that are suitable for implementation in both clinical and research settings.

Phase 2: Development of physical functioning indicators

Chapter 8: The selection of a method of measurement: Treatment Evaluation by A LE Roux's method (TELER)

Chapter 9: Determining the desired outcome: A qualitative study to explore patients' perspective of living with LBP

Chapter 10: Combining outcome components into one measure: Generating TELER codes from patients' narrative

Chapter 11: Item calibration and validation of TELER LBP indicators: Expert validation

Overview of phase 2: Development

A critical review of *pain* and *back disability* scales was conducted in the first phase of this thesis identified major problems in the development and application of six of the most commonly used LBP outcome measures. The critical review in Chapter 7 concluded by suggesting that current commonly used LBP scales might not be suitable for use in clinical setting. This is confirmed in a recent study that explored the content of the current LBP outcome measure that physiotherapists used in their clinical practice (363). Gardner *et al.* (363), p. 1035, suggested that current "*clinical outcome measures may not be providing accurate information about the success of treatments that are meaningful to the patient*". This lack of suitable LBP scales in the field of physiotherapy requires developing a new measurement tool that adhere to the logical requirements of measurement, scientific standards and qualifiers of measurement. These criteria will be further explained in the following subsections.

Costa *et al.* (9) conducted a literature review of LBP back-disability scales that were cross-culturally adapted from their original languages into other languages. None of the measurement tools were originally designed for individuals who speak Arabic. Furthermore, only two out of forty back disability scales were cross-culturally adapted from their original language into the Arabic language. However, these two translated scales were not cross-culturally adapted specifically for the Jordanian population (354,364). This might limits their use in the Jordanian physiotherapy clinics due to the differences in the accents or words' appropriateness. For example, the RMDQ was cross-culturally adapted to the Arabic language to be used in Tunisia (354). The authors selected words that are relevant to the Tunisian society, such as 'برشا' and 'باش', and not to the Jordanian society. Thus, the aim of the second phase of this research programme is not to cross-culturally adapt one of the current LBP scales but instead to develop a new outcome measure that is capable of evaluating clinically important changes in outcomes important to Jordanian individuals with LBP following physiotherapy interventions.

There are many guidelines and recommendations in the healthcare literature that aid the process of developing a new measurement tool, such as the framework devised by Kirshner and Guyatt (76) or the recommendations of the Physician Consortium for Performance Improvement (365). There are two common features that are shared between

these guidelines; these are the selection of an appropriate method of measurement that guide the designing of the new measurement tool and defining the desired outcome for the targeted population (23,76,365). Chapter 8 in this thesis addresses the first point, which is related to the selection of a suitable method of measurement. This has been achieved through a literature review. Chapter 9 addresses the second point, which is identifying the desired outcome for the Jordanian individual with LBP. This has been through a qualitative study that explored outcomes that are important to Jordanian individuals with LBP.

The selected method for developing the new measure should ensure that the measurement tool is practical and scores generated are meaningful and useful in either clinical or research settings (249,251,300). According to the findings of the first phase in this thesis, the selected method of measurement should fulfil the following criteria:

1. Logical requirement of measurement [discussed extensively in Chapter 4].

    - Defining the desired outcome and the factors influencing it.
    - Identifying whether the construct is quantitative, such as bone density, or qualitative, such as physical functioning.
    - Exclusive and exhaustive definition of dimensions of the selected outcome.

2. Scientific standards of measurement [discussed extensively in Chapter 5].

    - The rules for assigning a numeral to an attribute should be made explicit.
    - Identifying the level of measurement and the mathematical properties of the resulting measurement tool.
    - The use of appropriate mathematical and statistical operations according to the characteristics of the phenomenon under scrutiny.

3. Qualifiers of measurement [discussed extensively in Chapter 6].

    - Ensuring validity, reliability, responsiveness and meaningfulness.
    - Defining a clear unit of measurement that possess a singular meaning.
    - Appropriate use of numerals or numbers on the scale depending on the level of measurement.

These criteria are important for three reasons. Firstly, to ensure the development of a measurement tool that is able to monitor changes at the individual level as well as group level. Secondly, to ensure that the new measurement tool is able to provide useful and meaningful information that guides decision-making process to interested stakeholders, such as patients, clinicians, managers or commissioners. Thirdly, to ensure that patients are at the centre of their care and who determining what is to be measured within the frame of what physiotherapy services can help them to achieve.

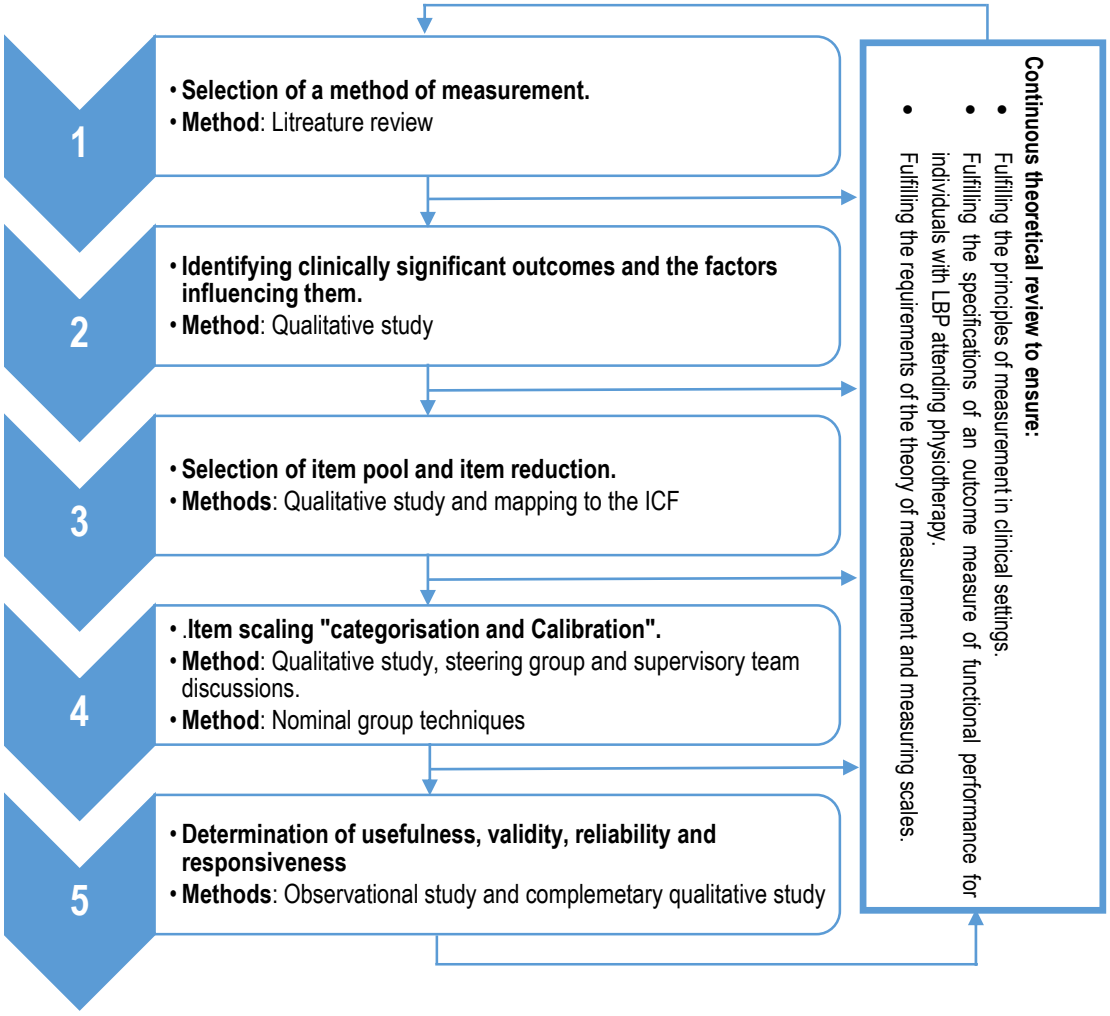
The following objectives were linked in the process of constructing a new LBP measurement tool (76,366):

1. Selection of a method of measurement [Chapter 8].
2. Identification of clinically significant outcomes and factors influencing them [Chapter 9].
3. Selection of the items pool and item reduction [Chapter 10].
4. Review of the initial items by experts for categorisation and calibration [Chapter 11].
5. Determination of usefulness [Chapter 12].

Kirshner and Guyatt (76) suggested that reliability, validity, responsiveness should be considered during the process of development. These measurement properties were tested in Chapter 12.

Figure 8.1 provides an overview of the process of constructing the new measurement tool and the methods used in each stage. The following chapters will provide a detailed overview of the methods used in each of these steps.

Figure 8.1 A diagram representing the stages of development of new outcome measure



(Adapted from Okasheh (366)*).*

Chapter 8: The selection of an appropriate method of measurement – Treatment Evaluation by A LE Roux's method (TELER)

Key point in Chapter 8:

- The TELER method adheres to the rules of levels of measurement and the requirements of measurement in a clinical context; therefore, this method was chosen in this research programme to construct the new LBP measurement tool.

8.1 Introduction

Babbie (271) suggested that science, in general, is standing on two pillars, which are observation and measurement. The Science Council in the UK also supported this opinion in their proposed definition of 'science' (75). Phase 1 in this thesis indicated that physical functioning is an observable phenomenon; however, it is not clear up to this stage in this research programme whether or not Jordanian individuals with LBP consider it to be their desired outcome following physiotherapy. Thus, in order to develop the new LBP measurement tool, a mixed-method design was required (Table 8.1). Mixed-method approaches are used by pragmatic researchers who employ the most appropriate methods or techniques used in qualitative and quantitative methodologies and apply them within one study (367). Table 8.1 shows examples of four mixed-method designs in the healthcare literature. It seems that design 1 in Table 8.1 is suitable to guide the development of the new measurement tool. Thus, a complementary qualitative methodology has been used in Chapter 9 in this thesis to explore the impact of LBP on individuals' lives and identify the concepts required to develop the new measurement tool later in Chapters 10 and 11. Following the development phase, a quantitative method has been used in Chapter 12 to investigate the clinical utility and the psychometric properties of the new outcome measure.

It is important at this stage before identifying the 'desired outcome' to select a suitable method of measurement. This method should generate quantifiable data that inform clinical decisions at the level of the group but not at the expense of clinically important individual results.

Table 8.1: Priority-sequence model in mixed-method approach

		Priority decision	
		Principal method: Quantitative	Principal method: Qualitative
Sequence decision	Complementary method: Preliminary	**Design 1** qual ⟶ QUANT e.g. to generate hypotheses, develop questionnaires	Design 2 quant ⟶ QUAL e.g. to guide purposive sampling, identify areas to pursue in depth
	Complementary method: Follow-up	Design 3 QUANT ⟶ qual e.g. help to interpret poorly understood results, help explain divergent findings	Design 4 QUAL ⟶ quant e.g. to generalise results to other settings, test elements of emergent theories

Adapted from Morgan's Priority-Sequence Model cited in Simons and Lathlean (367).

Mawson (368-371) and Okasheh (366) suggested the Treatment Evaluation by Le Roux (TELER) method as a suitable method of measurement in the healthcare field. In order to ensure rigour and avoid bias within this thesis, the author undertook a literature review to search for any suitable methods of measurement other than TELER which are appropriate for the purpose of measurement of change in a clinical context. The literature review used different combinations of relevant keywords (Table 8.2) and databases CINAHL, Health Source: Nursing/Academic Edition, MEDLINE, Scopus and PubMed. The initial search retrieved 22 studies; however, after reading the abstracts of these studies, this research programme could not identify methods of measurement other than TELER published in the healthcare literature.

Table 8.2: Keywords used in the literature search for a suitable method of measurement

Keyword 1	Keyword 2	Keyword 3
method approach	develop design generate	questionnaire index scale measurement tool

Table 8.3 suggests that the TELER method was utilised by many healthcare professions in both research and clinical contexts. For instance, Mawson (368-370,372) developed sets of functional and component indicators that measure the impact of stroke on people's lives. Grocott *et al.* (373-376) developed sets of functional, component and quiz-style indicators to measure the effectiveness and quality of wound care, Okasheh (366) developed a set of functional indicators to measure changes in people with chronic obstructive pulmonary disease, and Bidmead (377) developed sets of quiz-style indicators to measure parent/health visitor relationships in community settings. A shared characteristic of these clinical areas is the complexity of the conditions and the interventions used within each of these fields.

Grocott *et al.* (375) indicated that TELER indicators could be applied to different conditions or ranges of activities, clinical or non-clinical, where the outcomes of interventions need to be measured over time.

Table 8.3: Examples of research institutes and clinics that use the TELER method in their work

Research institutes / clinics	Location	Field
Glasgow Royal Infirmary	UK	Every-day clinical use (Stroke recovery)
MoreRehab	UK	Every-day clinical use (General physiotherapy)
North East Lincolnshire Clinical Commissioning Group	UK	Every-day clinical use (Wound care)
Liverpool Clinical Commissioning Group	UK	Every-day clinical use
Kings College London	UK	The Glove Project Wound care in Palliative Care Parent/health visitor relationship
Guys and St Thomas's	UK	GLOVE project, developing a Hand Therapy Online System based on TELER for every-day clinical use
Great Ormond Street Hospital for Children	UK	
The University of Sheffield	UK	Neurological rehabilitation Musculoskeletal rehabilitation
Sheffield Hallam University	UK	Pulmonary rehabilitation
Iberwounds of Lisbon	Portugal	Every-day clinical use (Wound Care)
Istituto Nazionale Tumori	Italy	Measurement of palliative care (breast cancer)
University of Jordan	Jordan	Measurement of pulmonary rehabilitation effectiveness
SpineCare Jordan	Jordan	Every-day clinical use (General Physiotherapy)

From LongHand data (December 2014).

8.2 Background

The TELER method was developed during the 1980s by A. A. Le Roux (378). The TELER method is considered unique because it has a clear structure for making, collecting and presenting clinical notes for a patient who is receiving healthcare and to a manager who is assessing the quality of rehabilitation services (275). This method of measurement supports the development of different types of clinical indicators that aim to trace clinically significant changes in functional performance in a patient (342). The ability to monitor such changes or the lack of changes is important in order to support the process of clinical decision-making in a timely manner, ensuring that action is taken to alter the care plan for a particular patient without undue delay.

The TELER method has already been used in physiotherapy clinical settings in the measurement of functional performance in individuals with stroke (369) and chronic obstructive pulmonary disease (366). It therefore, might be feasible to use the TELER method in the construction of indicators to measure either pain impact or physical functioning in individuals with LBP following physiotherapy interventions in Jordan.

8.3 The assumptions of TELER

The TELER concept is derived from a series of assumptions (cited in Mawson (258)). These assumptions are as follows:

- The essential purpose of treatment is to promote change and prevent deteriorations.
- Effective treatment is patient-centred and patient-oriented.
- Effective treatment is grounded in theory.
- Change occurs in clinically significant steps over clinically significant periods of time.
- Change occurs naturally, spontaneously, and the model for spontaneous change is a constrained random walk (recovery pattern).
- Change, or the lack of change, which is unlikely to have occurred spontaneously or by chance was induced by something.
- The effect of clinically significant changes is not necessarily measureable on an interval or ratio scale, but are observable.

It seems that the TELER method conforms to the requirement of the theory of measuring scales. TELER also fulfils the standards of measurement in a clinical context (342). These criteria are significantly important to ensure the construction of a useful, informative and meaningful measurement tool. The TELER method acknowledges the imperfect nature of measurement, especially the measurement of a subjective phenomenon, such as pain and function. The precision of measurement will depend hugely on the understanding of the construct of interest under scrutiny. The TELER method constructs indicators according to clinical knowledge (258), which is obtained from experts in the field, from the healthcare literature and from the findings of specific research, such as interviews with clients.

8.4 Translating medium of TELER

All outcome measures require a translating medium. For instance, to measure temperature, mercury is embedded in a pre-calibrated transparent tube. Any alteration of temperature around this tube will result in a consequential movement of mercury upwards or downwards. Therefore, the mercury is considered a translating medium for temperature.

A TELER indicator also consists of a translating medium and a measuring scale (342). Le Roux (342), p. 1, defines the translating medium as "*an entity that converts the extent of an attribute to a point on a measuring scale*". The translating medium in a TELER indicator is observation. Thus, the TELER method facilitates the compatibility between observation and measurement, the two important pillars of science (75,271). This method

encourages clinicians to develop scientific scales. These should be scientific scales that can be tested empirically to be rejected or accepted (379). TELER indicators could be falsified[10] through observation or experimentation (168).

8.5 TELER indicators

There are three types of indicators that can be constructed using the TELER method: functional, component or quiz-style indicators. The title of each of these indicators represents the goal to be achieved during interventions and is negotiated rather than imposed on the patient or their carers (258). The TELER indicators do not contradict the theory of measuring scales by enforcing an interval or ratio scale on qualitative structures (275). For example, a TELER functional indicator uses an ordinal mathematical structure to measure a qualitative phenomenon, such as physical functioning. There are six clinically significant reference points [or TELER codes] in any TELER functional indicator. These codes are used to determine whether outcomes have happened by chance. Grocott (377) and Browne *et al.* (381) suggested that if there are five clinically significant improvements, the probability that the outcome happened by chance is less than 2.5%.

TELER acknowledges the use of numerals, not numbers, to define the codes in each of TELER's indicators, and uses acceptable statistical tests to analyse ordinal-level data. The TELER method mandates the utilisation of explicit clinical knowledge in the definition of an indicator. This is important to ensure that the definition contains different dimensions of a construct of interest and accounts for possible factors influencing that construct.

The TELER function and component indicators aim to measure significant changes in a client over a given time period. The quiz-style indicator is time-independent; therefore, it can be used when a client is seen only once.

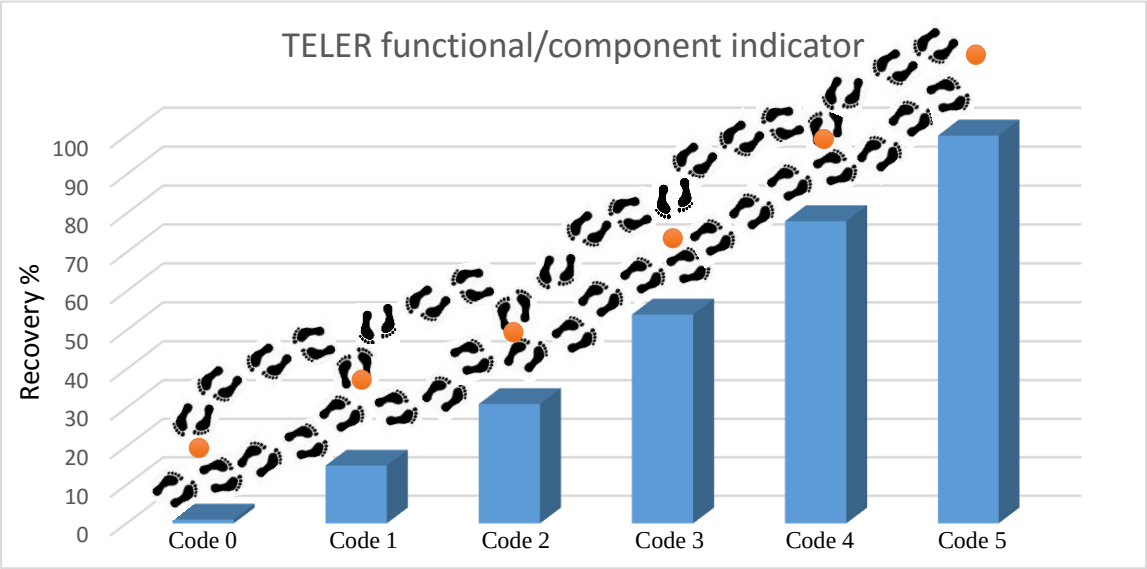
8.6 TELER codes

Typically, the TELER function or component indicators are a six-point ordinal scale that traces changes and no changes in different conditions (275). These six points are assigned to numerals 0 to 5. Code 0 in a TELER indicator means the presence of a problem that is relevant to the respondent and is amenable to change with the proposed intervention.

[10] Falsifiability is the belief that for any hypothesis to have credence, it must be inherently disprovable before it can become accepted as a scientific hypothesis or theory (380).

Code 5 means the resolution of the problem in specific circumstances relevant to the population under examination. The remaining codes represent the various intermediate outcomes of the process of improvement (Chart 8.1).

Chart 8.1: An example of a tracing change in a patient health status using a TELER indicator



The TELER method generates indicators that have unique codes. For example, codes (*units of measurement*) in TELER functional indicators represent a hierarchical stepwise regain of functions which, as with the employment of clinical knowledge, might represent, as closely as possible, the patterns of recovery of functions following therapy (366). The TELER method assumes that each code in a TELER indicator represents one clinically significant change that is determined through clinical knowledge of experts or the living experience of the patients (275).

Each code in a TELER indicator is based on the notion of using clinically significant changes over clinically significant periods as a measure of change in the patient health status. For example, Chart 8.1 represents a recovery pattern for patient X. This chart shows that there were fluctuations in the recovery pattern. The orange circle in the chart represents a point in time where a person who is carrying out the measurement, using the TELER form, must ensure that all of the conditions of a TELER code are satisfied before assigning that code to patient X. The definitions of the codes in a TELER indicator utilise a language that is easily understood by the respondents, the therapists and the managers. Each code in an indicator should be a *unique* marker (●) on the recovery curve. This would make the outcome measurement using the TELER method easily interpreted.

The definitions of the codes are based on explicit knowledge of the condition, the theoretical mechanism of the intervention and the inclusion of patients' experience of the trajectory of functional losses as a consequence of the presence of the condition. This ensures that the TELER indicators are sensitive in detecting changes in functional performance. It is important to note that "*a TELER indicator serves the particular purpose of tracing change in a functional deficit and it does not measure the extent of a functional deficit*" (LeRoux (342), p. 21).

Codes in the TELER indicators represent clinically significant outcomes that are defined with reference to theoretical, scientific and clinical knowledge as well as patients' and clinicians' experience. These codes are represented by numerals and provide an ordinal level of measurement. Clinically significant changes are different from clinically significant outcomes. A clinically significant change is "*the amount of clinical change that is required to achieve the next clinically significant outcome on the TELER indicator*" (366), p. 260.

Codes in any TELER indicator represent an ordinal scale of measurement; therefore, the amount of change between any two successive codes are not equal. It is not possible to quantify the amount of clinically significant change required to achieve one clinically significant outcome. However, the number of changes required to achieve a particular clinically significant outcome can be counted. The counting process does not require equality. For example, it is common to count how many people there are in a room with all of the inherent differences between them. Numbers can be used to count clinically significant changes and it could be subjected to arithmetic operations (382).

8.7 Structure of the TELER form

The TELER form is a composite of two elements: a system of clinical note making and TELER indicators (275). Grocott *et al.* (375), p. 13, stated that "*the clinical note-making element comprises data that are routinely collected including patient identification numbers, demographic details, clinical history, diagnostic tests, diagnoses and medical and surgical interventions*". The clinical note-making element enables clinicians to trace clinically significant information in a systematic approach using a structured form, which also provides information such as the number of visits, the management plan and patients' goals (275). "*The clinical measurement element collects observational data through the TELER Indicator, a numerically formatted ordinal scale of patient outcomes at the point*

of treatment and care. It records the relationship between the treatment and care given, how it was perceived by the patient and the outcomes in terms of clinically significant change" Grocott *et al.* (375), p. 13.

The TELER method also includes software that generates indices (Table 8.4) that provide more information about the patient's health status. The data generated from these individual indices can be aggregated to provide an informative conclusion to third parties, such as managers, commissioners or policymakers, about the quality of healthcare services offered to a group of patients (275).

8.8 Summary

The TELER method, theoretically, fulfils the requirement of an outcome measure of functional performance, the rules of levels of measurement and the qualifiers of measurement in a clinical context. Previous studies showed that the TELER method is promising, as it brought together clinicians, clients and researchers in the quest for the development of suitable outcome measures in different areas. Therefore, it was chosen to construct the new LBP measurement tool. This method encourages clinicians to firstly identify the desired outcome that is relevant and important to the patient. Thus, the next chapter describes a qualitative study that explores the impact of LBP on Jordanian individuals and determines the desired outcome following physiotherapy interventions.

Table 8.4: Definitions and values of TELER indices

TELER index	Definition	Range	Meaning
Deficit index (DI)	A measure for tracing change since admission in physiological, psychological or other clinically significant function presented by a patient. It shows the extent of functional loss and the potential for improvement.	Range from 0 to 100.	The values are percentages in the range 0 to 100 where 0 denotes 'no loss of function' and 100 denotes 'complete loss of function'.
Improvement index (II)	A measure for tracing recovery of lost function between successive appointments. The number of lost treatment goals is the number lost before admission plus the number lost while under treatment	Range from 0 to 100.	The values are percentages in the range 0 to 100 where 0 denotes 'no recovery' and 100 denotes 'full recovery'. The value 0 also denotes the situation where loss of function under treatment had increased the value of the Deficit Index above its value on admission.
Variability index (VI)	A measure for tracing changes in a patient's condition while the patient is under treatment. Variability is measured by reference to the changes that are deteriorations. In many contexts it can be assumed that variability denotes a lack of control of the recovery process and of the cost of treatment.	Range from 0 to 100.	The values are percentages in the range 0 to 100 where 0 denotes 'no variability' and 100 denotes 'maximum variability'. In many contexts, 0 denotes 'complete control of the recovery process and minimum cost of treatment' and 100 denotes 'no control of the recovery process and maximum cost of treatment'. When the Variability Index is less than 50 it shows improvements exceeded deteriorations and the patient's condition improved. The smaller the Variability Index, the more complete the improvement. A Variability Index of 0 shows all changes were improvements and vice versa. When the Variability Index is 50 it shows improvements balanced deteriorations and loss of function since admission was recovered.
Effectiveness index (EI)	A measure for tracing effectiveness in avoiding deterioration over a period of treatment. EI = 100 – VI. In many contexts it can be assumed that lack of effectiveness denotes a lack of control of the recovery process and of the cost of treatment.	Range from 0 to 100.	The values are percentages in the range 0 to 100 where 0 denotes 'no effectiveness in avoiding deterioration' and 100 denotes 'completely effective in avoiding deterioration. In many contexts, 0 denotes 'no control of the recovery process and maximum cost of treatment' and 100 denotes 'completely in control of the recovery process and minimum cost of treatment'.

- *A patient-specific measure that does not permit valid comparisons of patients.*
- *The measure is based on the assumptions that a clinically significant change occurs over a clinically significant period, and the intervals between successive appointments are clinically significant periods or parts of such periods.*
- *The information presented in this table is adopted from Le Roux (383).*
- *The formula for calculating each of these indices is copyright-protected; therefore, they were not presented in this table.*

Chapter 9: Determining the desired outcome – A qualitative study to explore patients' perspective of living with LBP

Key point in Chapter 9:

- This chapter suggests that LBP is a multidimensional experience that includes aspects of pain, function, social limitation, psychological impact and spiritual issues. The patients' understanding of their problem appears to underpin other aspects of the LBP experience, for example setting goals and concordance with therapy. Restoring physical abilities was identified in this chapter as 'the desired outcome' following physiotherapy interventions.

9.1 Introduction

This chapter presents the findings of a qualitative study that explored the impact of LBP on people's lives. The study was conducted in Jordan. The study forms the second part of the second phase in this thesis. Life goals[11] that were identified by Jordanian individuals with LBP as important following physiotherapy interventions were used in the next chapter to construct the new Arabic outcome measure.

A recent meta-synthesis of qualitative research by Snelgrove and Liossi (384) showed that the majority of the qualitative studies were conducted in Scandinavia and North America. Thus, little is known about the impact of LBP on people who are living in Jordan and whether or not there is any difference between their experience and the experience of other populations in different countries. Furthermore, the first phase of this research programme identified a number of studies that strongly recommend future qualitative research to investigate individual perceptions of functional abilities and pain and to understand the impact of LBP on a patient's quality of life in their own words (385). It is noted that the quantitative approach dominates the LBP literature (386-388). This research programme has identified a gap in the literature: despite the high prevalence and level of disability associated with LBP worldwide (3), and specifically in Jordan (92,93), little is known about the impact of LBP on Jordanians' physical abilities, emotions, psychological status and social functions (5,384). Therefore, the aim of the study presented in this chapter is to explore the experience of living with LBP and determine the desired outcome. The identification of life goals that are important to individuals with

[11] Mawson *et al.* (372), p. 524, defines life goals as "*A measurable, meaningful and achievable activity that is jointly (patient, carer, therapist) identified and agreed, contextually based on the patients' clinical needs, their social and environmental background, a state which the individual seeks to obtain, maintain or avoid*".

LBP is of great importance in building up the theoretical framework for a pertinent outcome measure in the following stages of this thesis.

9.2 Qualitative study design

A qualitative method was used for this stage of the study to explore the impact of LBP on individuals' lives and identify the concepts required to develop the new measurement tool.

Usually, the first step when designing qualitative research is to select and justify an ontological and epistemological premises for the collection of qualitative data (388,389). The researcher conducted a rigorous review of the qualitative methodology to understand and adopt suitable approaches within this study. These positions were explained in detail in the following subsections.

9.2.1 Ontology and epistemology

Ontology is defined as "*the nature of the social world and what can be known about it*" (Ritchie and Lewis (389), p. 1). This research programme adopted the critical realism position, as it acknowledges that whilst an external reality exists it is only accessible and understood through human experience and understanding. LBP is therefore likely to be understood through individual interpretations and socially constructed meanings, which could be explored using subjective words and descriptions (389,390).

The second requirement when designing a qualitative study is to understand the different epistemological schools within the qualitative literature. Ritchie and Lewis ((389), p. 1) define epistemology as "*the nature of knowledge and how it can be acquired*". Positivism and interpretivism are two of the schools which are commonly reported within health services research (389,390). The positivists approach is more commonly aligned with quantitative research (389,390). The positivists approach considers the world independent of the researcher's perspectives and considers that it is possible to conduct objective and value-free investigation (389). Conversely, the interpretivism approach is more commonly aligned with qualitative research (389,390). The interpretivist position requires the researcher to directly interact with the social world and context of the phenomenon in question. In contrast to positivism, interpretivism accepts that the researcher and participant interact with each other in generating the data and its interpretation.

The extent to which this interaction influences study findings is monitored using reflexivity. This helps to ensure that the findings are grounded in the data and not the researcher's pre-conceived knowledge. It is appropriate to explore and understand a human experience using an interpretivist approach that captures both the researcher's and the participants' understanding (389).

Interpretivist and pragmatic approaches were adopted in this qualitative study for the following reasons. Firstly, many studies had indicated that LBP is a complex, multidimensional condition (biological, psychological and social dimensions); thus, it requires an in-depth understanding of different patients living with different problems and life contexts (389). Secondly, interpretivism might provide a scientific and systematic method to achieve a thick description and detailed interpretations around individual reality.

It is possible that some of these commonly used outcome measures within the LBP field were developed based on exploratory qualitative studies. However, this research programme identified only one back-disability measure that was constructed according to the findings of a qualitative study, but that qualitative research was not published in a peer-reviewed journal. The critical review in the previous phase suggested that many of these commonly used outcome measures within the LBP field were primarily constructed according to the views of expert professional knowledge rather than the perspectives and experiences of people with LBP. Some of these measures, such as the RMDQ, ODI or the VAS, did not take into consideration exploring patients or physiotherapy perspectives during the construction phase when developing these scales. This further justifies the need for the qualitative exploration presented here. The qualitative study presented here helps to understand different perspectives of LBP from different points of view.

This research programme aimed to construct a new outcome measure that addresses patients' views as well as concepts used in the current scales. Clinicians and patients are those who observe and experience the impact of LBP on quality of life. Thus, their knowledge was the basis for constructing the LBP TELER indicators through the qualitative study and nominal group techniques in Chapter 11.

9.3 Methods

Semi-structured in-depth interviews and thematic framework analysis methods were used in this qualitative study (390). The following subsection will review in detail the setting, sampling, recruitment and data collection methods, method of analysis and measures of quality of data interpretation.

9.3.1 Aim

The purpose of this qualitative study was to explore the perceptions and perspectives of the impact of LBP on the lives of Jordanian people following physiotherapy interventions for LBP and to determine the desired outcomes for measurement.

9.3.2 Research questions

The key research questions were as follows:

- What are the extent and nature of the impact of LBP on the quality of life of Jordanian people with LBP?
- What is the desired outcome of physiotherapy interventions for people in Jordan with LBP?

9.3.3 Setting

This qualitative study took place at the Ministry of Health/Jordan hospitals that a have physiotherapy department that treats individuals with LBP. These were Albashir, Altoutanji, King Abdallah and Alkarak hospitals.

9.3.4 Sampling method

Purposive sampling was adopted in this study to ensure that the participants recruited will enable this study to answer the research questions. Furthermore, purposive sampling was selected to ensure a wide range in terms of important characteristics, e.g. different ages, genders, occupations (working or not working due to LBP) and stages of LBP. Individuals who met the inclusion/exclusion criteria (Table 9.1) were invited to take part in this study by the hospital admission team. Senior physiotherapists who were responsible for allocating the cases to the physiotherapy team reviewed each patient's referral form and checked whether or not the patient could be invited to the study.

Table 9.1: Inclusion and exclusion criteria of the qualitative study

Inclusion criteria	Exclusion criteria
• Participants who consider LBP as their main complaint. • Participants' greater than18 years old, this is important because they will be primarily responsible for their participation in this study and able to consent. • Participants who are referred to physiotherapy by rehabilitation or orthopaedics physicians to represent typical practice in Jordan. • Those who agree to take part in the study voluntarily.	• Any participant who is unable to communicate in Arabic or English as the main researcher is able to communicate in these languages. • Any patient who is not clinically or medically stabilised. • Any patient who is unable to provide consent.

9.3.5 Recruitment method

Recruitment was carried out in four settings in three different locations, rural and urban, in order to achieve a diverse sampling frame. The director of studies sent a letter [Appendix A] to the study hospitals or clinics in Jordan. Those who agreed to take part in this research were asked to distribute information sheets [Appendix B] to patients primarily complaining of LBP in the relevant hospitals and orthopaedic clinics. Administrators who were working in these hospitals or clinics approached potential participants and gave them information sheets once they were referred to see a physiotherapist. One week later, patients who took the information sheets were asked by the physiotherapist or administrator if they would like to take part in this research. Patients who agreed to participate voluntarily were asked to complete and sign a consent form (Appendix C) prior to the interview.

Those participants who agreed to take part were contacted by the main researcher to arrange an interview at their convenience. Prior to the interview, consent was verified. Recruitment continued until the point of data saturation; this is where further analysis does not reveal new themes from the data (391,392).

9.3.6 Data collection method

The researcher used in-depth interviews to explore the patients' perspectives of the impact of LBP on their life and to identify the most desired outcome for them following physiotherapy treatment. This method of data collection was used because it offered the opportunity for a detailed understanding and an insightful exploration of the impact of LBP. In addition, in-depth interviews are preferable when individual participants' experience and views might differ, if there is a possibility that participants know each other and that it would impede their contribution, or if there are some issues of status or

power (389,390). The researcher used semi-structured interview as the method of collecting data because it provides an acceptable level of flexibility, using an interview guide developed with reference to the literature (Appendix D). The interview topic guide contained fairly general questions that were asked of all participants but also allowed the researcher to probe and explore additional topics. The emphasis was on exploring the interviewees' understanding of their LBP, their concerns and beliefs about the impact of LBP on their life, and the desired outcome following physiotherapy interventions.

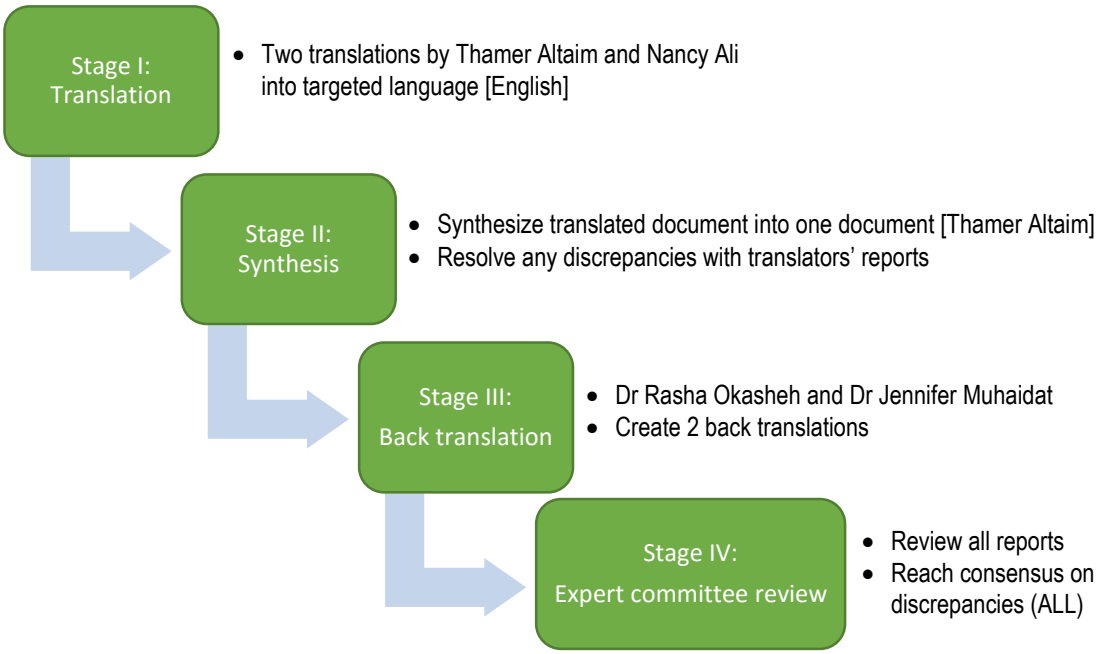
All interviews were carried out in meeting rooms within the hospitals at times close to the participants' sessions. They were asked to sign consent forms prior to interviews. All interviews were audio-recorded using an electronic audio recorder that was locked with a password. All audio files were transferred to a computer that was locked with a password. Each audio file was assigned a unique number to maintain the anonymity of participants through the research. The names of the participants, the demographic data and their unique numbers were stored in a secure electronic file accessible using a password.

9.3.7 Data analysis

Data was recorded, transcribed, coded, and analysed using the Arabic language. However, results were translated into English by two researchers according to well-established and rigorous guidelines (393,394) to enable the communication of the results to the supervisory team. Appendix E presents a summary of the qualifications of the translators and few examples of translation validation. These conceptual translations were reviewed by two independent researchers from the University of Jordan: Dr Rasha Okasheh and Dr Jennifer Muhaidat, who have a good command in Arabic and English languages, and both had a PhD in physiotherapy.

Figure 9.1 shows a graphical representation of the stages of conceptual translation recommended.

Figure 9.1: Conceptual translation between Arabic and English



From Beaton et al. (394)

Framework analysis was used to interpret and construct general themes obtained from these inductive and deductive approaches used simultaneously (390,391). Boyatzis (395) defines a theme as "*a pattern found in the information that at minimum describes and organises possible observations and at maximum interprets aspects of the phenomenon*". Framework analysis was used because it has a clear structure and allows an in-depth understanding of the phenomenon of what is important to participants using their own words (396).

The process of thematic framework analysis includes five stages as described by Ritchie and Spencer (397), p. 173-194.

1. **Familiarisation**: The researcher audio-recorded all interviews and transcribed them verbatim; the researcher listened to these interviews many times to familiarise himself with points raised during the interview.
2. **Identifying a thematic framework**: an initial theoretical framework was developed at this stage from the literature and from emerging issues during the familiarisation stage. This framework was flexible and subject to refinement to accommodate emerging new themes during subsequent stages of analysis.
3. **Indexing**: this stage applied a thematic framework directly into the transcribed text using either textual or numerical codes to identify particular fragments of data which are directly related to different themes.
4. **Charting**: headings from the thematic framework were used to develop charts; similar codes obtained from different interviews' transcripts were gathered to allow the opportunity for cross-sectional comparison between different participants.
5. **Mapping and interpretation**: the researcher at this stage searched for patterns, explanations, concepts and associations within the transcribed text, aided by plots or visual displays.

A thematic framework was developed based on themes found in this study. The thematic framework was continuously revisited and modified through analysis. Subthemes were merged if they provided a similar meaning. For example, hopelessness codes and depression codes were merged under the subtheme *depression*. Following the familiarisation stage, a thematic chart was developed and data generated from the patients' interviews was mapped across all of the themes. This chart was continuously reviewed and modified to prevent any data loss. Data gathered in this qualitative study was rich; however, to achieve the aim of constructing a new outcome measure in this research programme, only those themes that were related to the development of the new TELER indicators were subject to more analysis. The identification of these themes related to the impact of LBP on people's lives and desired outcome after therapy. These indicators are required to detect and measure clinically significant changes that are important to the patients and induced by physiotherapy interventions.

9.3.8 Rigour of the qualitative study

This qualitative study includes tables and diagrams to illustrate how the themes were identified from the raw data; this helps to demonstrate and assess the rigour of the analysis (398). A researcher from Sheffield Hallam University [NA], who is a physiotherapist holding a Master's degree and who understands both languages, independently analysed 10 transcripts to verify the main themes identified. The interviewer [TA] kept a reflective blog of any additional information that related to the theoretical or practical issues that happened during the interviews.

Reflexivity is "*a term used in research methodology to refer to reflectiveness among social researchers about the implications of the knowledge of the social world they generate of their methods, values, biases, decisions, and mere presence in the very situations they investigate*" (Bryman (390), p. 715). In qualitative research it is important for the researcher to demonstrate that they are reflexive throughout analysis in order to show that the findings are grounded in the data, and not the preconceived ideas and beliefs of the researcher. Several techniques were used in this study to ensure that the researcher was reflexive and could demonstrate trustworthiness of the analysis. The researcher adhered to the criteria of trustworthiness while carrying out the thematic framework analysis: dependability, confirmability, credibility and transferability (Table 9.2). These criteria are of great importance to ensure the rigour and improve the quality of qualitative studies (399).

Table 9.2: Establishing trustworthiness

Criteria	Explanation	Techniques used to meet the criteria
Credibility	This item reflects the *precision* of the results obtained to truthfully reflect participant perspectives.	Two independent researchers from the university of Jordan, who are physiotherapists scrutinised the transcripts and the identified themes and subthemes. Iterative discussions round data interpretation
Transferability	The ability to transfer obtained results to similar research setting or enhance the ability to generalise the results obtained to other similar clinical setting.	Continuously challenging the identified themes and/or subthemes during interviews. Member checking and feedback strategies to enhance verification within the interview. Keep full description of the research context and the assumptions that were central to the research.
Dependability	The ability to show how exactly the research was conducted and report the research design to allow the ability to replicate results if the research is repeated.	Keeping a reflective journal and field notes which can be added to the collected data.
Confirmability	The requirement to control and limit the researcher bias by conveying the results to reflect what was reported by participants.	Reflexivity to aid self-reflections as an attempt to monitor researcher bias. Reflections on research and a critical comparison with previous literature

Adapted from Tod (399) with citation to Lincoln and Guba (1985), and Ritchie and Lewis (389).

9.4 Findings of the qualitative study

Forty Jordanian people with LBP referred to physiotherapy took part in this qualitative study. This study included a heterogeneous sample that provided a good representation of different age groups range between 22 and 74 years old (Table 9.3). Interviews lasted between 6 and 44 minutes. However, the majority of interviews lasted for around 12 minutes. Data saturation was achieved after interviewing the first 10 participants in the middle of Jordan. However, interviews were conducted in four different settings. Each setting was treated separately at the beginning of the data collection phase in this qualitative study; thus, data saturation was examined separately in each clinical setting. Data analysis of interviews showed that no differences between themes emerged from the data collected in different settings; therefore, data from different settings were merged with each other later on in the analysis. There were approximately an equal number of men and women were interviewed in this study.

Those who took part in this study, across the three geographical settings, were of a mixed background, including Bedouin, farmers and city dwellers. This provided a range of participants in terms of ethnicity and culture. Furthermore, the sample included people from two main religions in Jordan: Islam and Christianity.

Analysis of the data shows that LBP is a multidimensional experience that includes aspects related to physical functioning, social functioning, mood and spiritual practices. Eleven themes and 43 subthemes emerged from the patients' interviews. A conceptual framework that describes these themes and the interactions between them is presented in Figure 9.2.

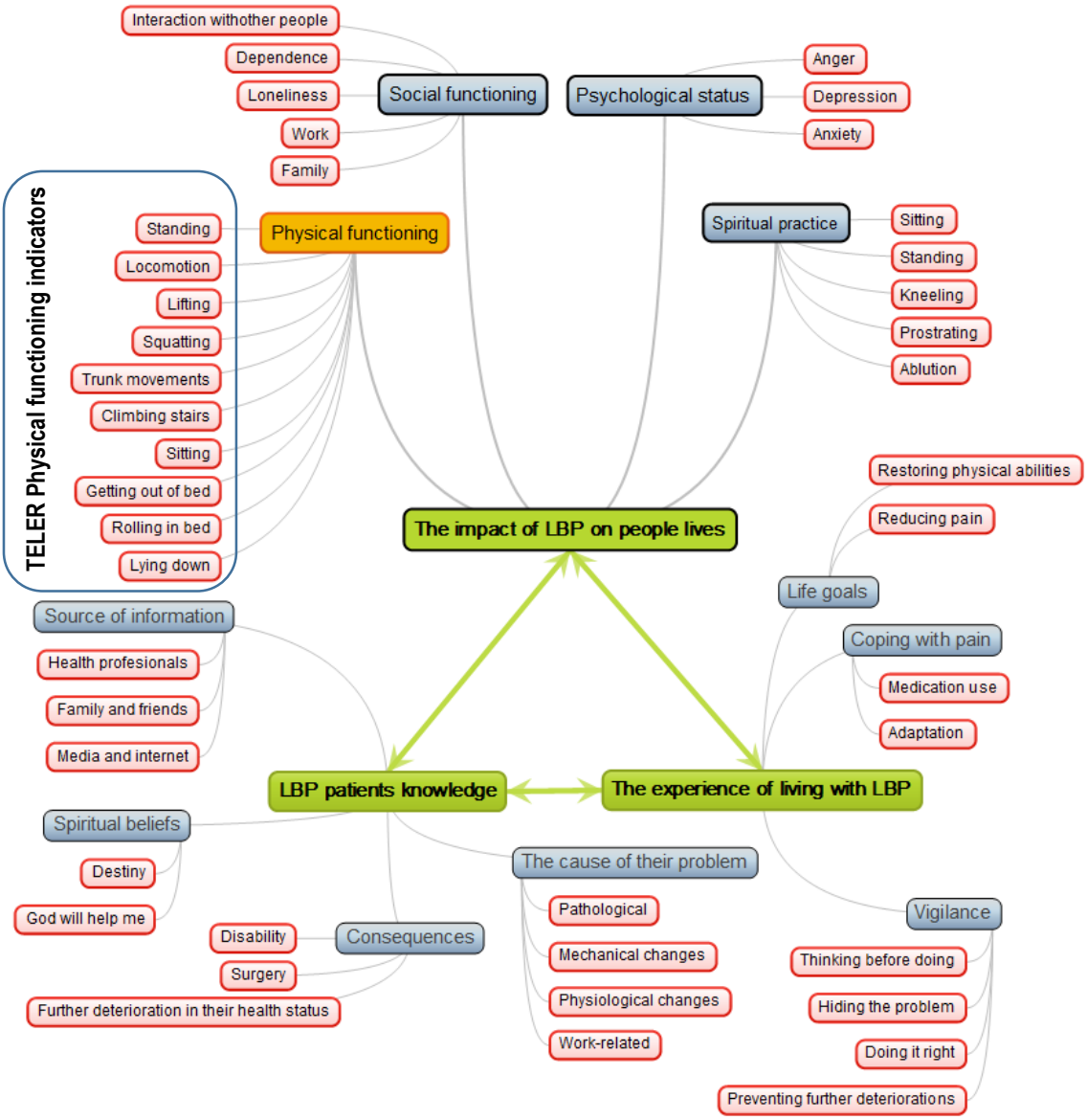
The following sections will present the main findings of this qualitative study and describe the LBP experience from the patients' perspective. This section is divided into seven subheadings (Figure 9.2). These subheadings are as follows:

- Impact of LBP on physical functioning
- Impact of LBP on psychological state
- Impact of LBP on social functioning
- Impact of LBP on spiritual practices
- Coping with pain
- Evaluating health status and determining life goals
- Vigilance

Table 9.3: Participants' demographics

Middle of Jordan			Occupation	Social status
LBP - 01	63	Male	Imam	Married
LBP - 02	48	Female	Housewife	Married
LBP - 03	45	Female	Housewife	Married
LBP - 04	43	Female	Housewife	Married
LBP - 05	47	Male	Dustman (Municipality of great Amman)	Married
LBP - 06	52	Female	Housewife	Married
LBP - 07	37	Female	Dressmaker	Married
LBP - 08	51	Female	Housewife	Married
LBP - 09	57	Male	Retired teacher	Married
LBP -10	54	Female	Housewife	Married
LBP -11	45	Female	Housewife	Widow
LBP -12	27	Female	Midwife	Married
LBP -13	43	Male	Senior Nurse	Married
LBP -14	59	Male	Bus driver	Married
LBP -15	42	Female	Nurse	Married
LBP -16	46	Male	Senior accountant (Ministry of Finance)	Married
North of Jordan				
LBP - 17	60	Female	Religious studies teacher	Married
LBP - 18	47	Female	School supervisor	Married
LBP - 19	45	Male	Chef (Ministry of Health)	Married
LBP - 20	59	Male	Olive oil factory (Manager)	Married
LBP - 21	22	Male	Programmer	Single
LBP - 22	23	Male	Med. Engineer	Single
LBP - 23	52	Female	Retired mathematics teacher	Married
LBP - 24	40	Male	General services (Ministry of Health)	Married
LBP - 25	50	Male	Customs	Married
LBP - 26	24	Male	Delivery driver	Single
LBP - 27	23	Female	Pharmacist (student)	Single
South of Jordan				
LBP - 28	64	Male	Retired accountant	Married
LBP - 29	31	Male	Physiotherapists	Married
LBP - 30	39	Female	Housewife	Married
LBP - 31	74	Male	Publisher	Married
LBP - 32	47	Male	Electrical engineer	Married
LBP - 33	44	Female	General services (Ministry of Education)	Married
LBP - 34	40	Female	Housewife	Married
LBP - 35	37	Female	Housewife	Married
LBP - 36	63	Male	Retired head teacher	Married
LBP - 37	33	Male	Carpenter	Married
LBP - 38	70	Male	Retired (unknown)	Married
LBP - 39	45	Female	Housewife	Married
LBP - 40	60	Female	Housewife	Married

Figure 9.2: A conceptual framework representing the impact of LBP on people's lives



Keys:

Domain

Main theme

1st Level subtheme

TELER physical functioning indicators

9.4.1 Subsection one: The impact of LBP on people's lives

9.4.1.1 Impact of LBP on physical functioning

All participants said that LBP was affecting their physical ability to perform various daily activities (Table 9.4). Participants indicated that different physical activities aggravated their pain or would further deteriorate their condition. However, three participants said that certain positions, such as lying down, or doing certain physical activities, such as walking or running, would help them to reduce their pain.

> *LBP 21 [patient ID] – 18 [paragraph no.]: "Walking helps me to decrease my pain. I will only feel exhaustion, muscle fatigue from walking. In fact, I don't feel pain at all when I run".*

Different physical activities had variable influences on people's perceptions and experience of pain. Participants stated that some activities helped them to reduce their pain and be more active. These physical activities include walking or lying down for a short period of time after standing up for a long time. Data generated from the patients' interviews showed that the speed of the movement is affected by LBP and individuals with LBP require more time to perform each of the physical activities listed in Table 9.4. Generally, it seems that the performance of daily activities is an important factor that tends to aggravate the perception of pain. Participants reported that spending more time on a task tends also to aggravate their LBP symptoms. This means that sleeping, standing or even walking for a long period of time would aggravate patients' symptoms. However, alternating between different positions seems to help to ease LBP symptoms.

> *LBP 32 - 10: "Standing, I mean standing for a long time in a queue or anything like that, I will feel stressed because I can't stand that long. I can't, I need to keep moving. I will feel annoyed because of long standing".*

Participants described how LBP negatively affected the speed of their movements, balance and equilibrium. Participants reported that they needed extra time to change their position.

> *LBP 6 - 9: "When I sit down, I mean I am sitting down right now; it will take me 10-15 sec to stand up and shake your hand. It will take a long time".*

Table 9.4: Impact of LBP on people's life

Theme: Physical functioning	**ICF code**	**Number (%)***	**Participants' quotations**	**LBP had negative impact on:**
Lying down for a long period of time	d4150, b1343, b1342,	10 (25%)	"*I get the pain if I sleep on my back for more than 15 minutes*" (LBP 12-10).	Sleeping, resting
Turning in bed	d4100	4 (10%)	"*If I want to turn (in bed) I can't turn over. If I want to sleep on my back, but I find it difficult to sleep on my back*" (LBP 8-18).	Sleeping, getting out of bed
Getting out of bed	d4100	13(32.5%)	"*When I'm getting out of bed in the morning … I feel that both of my legs are heavy and I feel pain*"(LBP 18-6).	Sitting, standing
Sitting	d4103, d4153	28 (70%)	"*I can't sit down properly for a long period of time*" (LBP 31-16).	Work, waiting for something, move towards standing
Standing	d4104, d4154	29(72.5%)	"*Sometime I can't stand up because of the severe pain*" (LBP 19-4).	Work, waiting for something, walking
Bending and rotating the trunk	d4105, d4102, d4152	19(47.5%)	*Bending: "My biggest problem is when I need to bend over. I mean it is painful" (LBP 23-6).* *Rotation: "I can't turn my trunk around to the right or to the left" (LBP 28-20).*	Work, lifting
Walking and running	d4559, d4501 d4500	26(65%)	"*This (LBP) will limit your abilities to use your legs, you can't walk or move around*" (LBP 28-10).	Work, social life
Squatting	d4101, d4151	5(12.5%)	"*I have these problems (pain and fatigue) when I use the squat toilet*" (LBP 8-4).	Pray, work, using the toilet, lifting
lifting	d4309, d4301	26(65%)	"*lifting and moving patients around, I mean we have a lot of patients who need to be moved from the bed to the stretcher and from the stretcher back to the bed, and all of this will increase my pain*" (LBP 13-44).	Work, social functioning, carry shopping bags
Climbing up/down the stairs	d4551	4(10%)	"*Going down the stairs or up to the roof will make me feel fatigued as well*" (LBP 8-4).	Work, social functioning

Theme: Psychological issues				
Anxiety	b1522	24(60%)	"*I am afraid that over a sudden I will not be able to move, stand up or sit down … I mean that I suffer disability, osteoporosis or a fracture in the spinal column without warning. I mean your doctor should warn you about this problem*" (LBP 02-32).	Vigilance, fear of movement, productivity, employment
Depression	b1529, b1265	11(27.5%)	"*Yeah sure, this problem makes me feel hopeless, anxious and depressed. I always feel as I have permanent disability. I try to overcome this disability, which I am suffering from at the moment. However, I can't forget it*" (LBP 02-12).	Adherence to therapy, productivity, social functioning
Anger	b152	22 (55%)	"*I want to go to work, or get something done or go somewhere, can you see what I am talking about …I become nervous and yell at one of my children to do it*"(LBP11-20).	Social functioning, work
Theme: Social functioning				
Family	d9205, d7702	18 (45%)	"*This problem has an impact on my relationship with my wife*" (LBP 5-18).	Sexual life, pregnancy, looking after family
Work	d859, d8451, d8500, d8502	28 (70%)	"*This problem affects my ability to walk or work at home*" (LBP 18- 6).	Productivity, income, salary
Interaction with other people	d9205, d7504 e3	10 (40%)	"*I feel shy to interact with other people or to visit them (fear of sudden pain while in a social event)*" (LBP 30-4).	Loneliness, visiting family or friends, psychology
Dependence	e310, e315, e320, e325,	22(55%)	"*There are so many things like washing or rinsing …I think to myself, I need one of my children to come and help me, so I postpone my work till they come back*" (LBP 35-30).	Productivity, self-confidence, physical activities
Loneliness	d9205, d7504	23 (57.5%)	"*All of this is affecting my mood. I don't want to be alone. I am afraid that if I felt angry on them they will leave me alone*" (LBP 11-24).	Social functioning, interaction with family

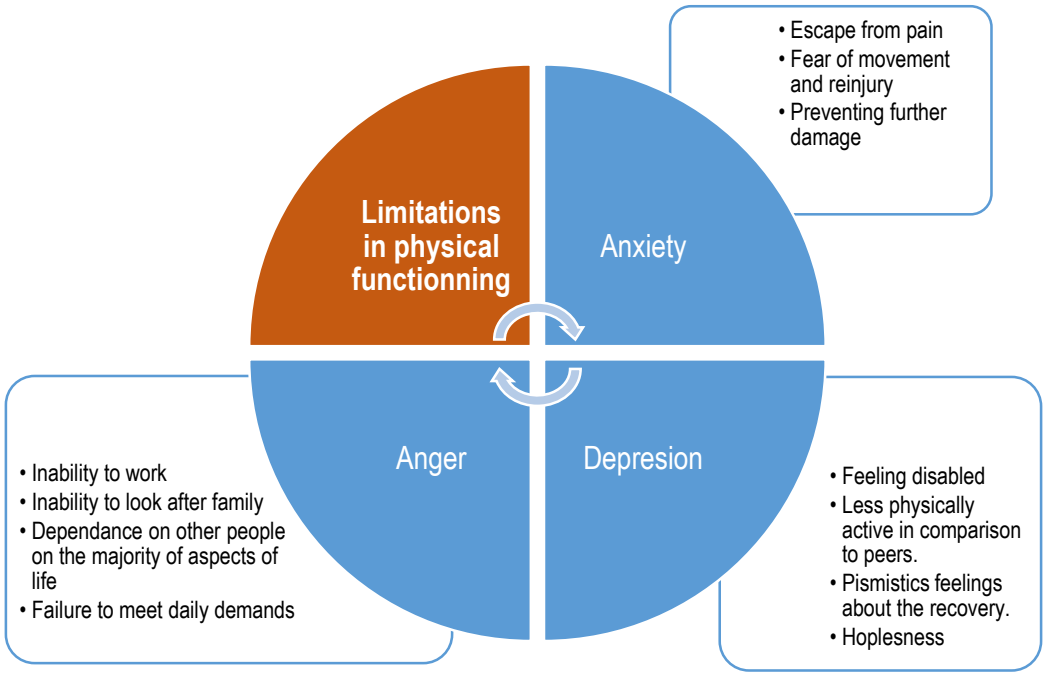
Participants mentioned that the impact of LBP on function affected their spiritual practice. It seems that these limitations in participants' physical abilities have negative consequences on their ability to practise their worship. Physical activities, such as ablution and prostrating, were also reported to be affected by LBP.

LBP 23 - 6: "It is not easy for me to raise my feet and wash them in ablution".

9.4.1.2 The impact of LBP on people's psychological state

Participants reported feeling anxious, depressed and angry, because of their LBP (Table 9.4 and Figure 9.3). They described how limitations in performing different physical activities seemed to have a negative effect on mood. However, participants also reported that these psychological issues that were related to LBP, such as anxiety, negatively affected people's ability to perform different physical activities, thus highlighting a cyclical pattern.

Figure 9.3: The impact of limitation in physical functioning on mood



9.4.1.2.1 Anxiety [12]

Approximately 60% of participants reported that they experienced anxiety because of LBP (Table 9.4). Participants' interviews revealed that some participants tend to make extra effort and preparation before doing different tasks to avoid aggravating their LBP symptoms later on.

> *LBP 21 - 12: "I need to plan everything before sleeping. I plan everything so I don't wake up with back pain the next morning".*

Most participants tended to be in a constant state of worry about doing a physical activity, such as moving around, which they believe can worsen their health conditions. Furthermore, they expressed their concern of ending up confined to a wheelchair, because of paralysis or suffering from spinal fractures. Participants perceived their bodies as fragile and that they might break their bones if they do certain physical activities too much.

> *LBP 02 - 32: "I am afraid that all of a sudden I will not be able to move, stand up or sit down … I mean that I suffer disability, osteoporosis or a fracture in the spinal column without warning. I mean your doctor should warn you about this problem".*

It appeared that the participants did not have an adequate understanding of their LBP problem. Participants chose phrases such as *cracked bones* and *the bones in my spine are fusing to each other*, which might indicate that they are worried to some extent about their physical abilities in the future. They reported unrealistic worries regarding problems such as a spinal fracture or osteoporosis and sought to prevent these. This highlights a distinction between fear and anxiety. Usually, fear is evoked by an immediate and/or realistic threat. Fear is considered to be an appropriate reaction to an apparent danger. However, participants in this study who suffered from chronic LBP and high levels of anxiety feared their movements and adopted several protective mechanisms to prevent further unrealistic deterioration in their health status and physical functioning.

> *LBP 21- 26: "I am prepared to stop playing football if it will further deteriorate my problem and increase the pain".*

[12] The national collaborating centre for mental health defines anxiety as "*worry and apprehension that is out of proportion to the circumstances. The worries are typically widespread, involve everyday issues and have a shifting focus of concern. The affected person finds these worries difficult to control, and this can result in decreased occupational and social functioning.*" ((400), p. 13). The previous definition stated that anxiety is a state of unrealistic worry about future events or situations that is only individually seen as threatening.

Another participant suggested that she is narrowing the space between her feet while walking to prevent further damage to her spine.

> *LBP 12 - 19: "when I decide to walk, I say to myself be cautious about your back, so I walk while I am in fear of doing something that will increase my problem. To avoid this I do not let my feet go away from each other … that far, I walk slowly with small steps to prevent any deteriorations".*

Generally, the majority of the participants were pessimistic and expecting the worst to come. This might happen as a result of the absence of patient education, or agreeing a long-term plan with healthcare providers, such as their physiotherapists. Furthermore, this state of over-thinking, unrealistic worries and difficulties returning back to a normal life might cause those who reported anxiety to experience various episodes of depression.

9.4.1.2.2 Depression [13]

Approximately 27.5% of participants said that they felt depressed because of LBP (Table 9.4). Many participants tended to compare their current physical status with what they were used to before feeling pain in the lower back. Those people reported a feeling that they were now disabled because of their LBP.

> *LBP 02 - 12: "Yeah sure, this problem makes me feel hopeless, anxious and depressed. I always feel as I have permanent disability. I try to overcome this disability, which I am suffering from at the moment. However, I can't forget it".*

Some of the younger participants compared themselves with those who are older, but are more active. They used these comparisons as indicators of their functional limitations. These comparisons give them the feeling that they lost something important and this loss has fed into their feeling of depression.

> *LBP 27 - 20: "I became so depressed, I feel so old. I cannot do the activities that people of my age do".*

Many participants indicated that they did not expect improvements, and they felt hopeless. Participants thought that they would not get any better, and they were prone to despair and giving into the pain.

[13] The World Health Organization (WHO) defines depression as "*a common mental disorder that presents with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration. Moreover, depression often comes with symptoms of anxiety. These problems can become chronic or recurrent and lead to substantial impairments in an individual's ability to take care of his or her everyday responsibilities*" ((401), p. 1).

One participant (LBP 28 - 24) indicated that he had lost his faith in all therapeutic techniques. He said:

> *"What I can do about it, I am literally hanging on to a straw. I mean those who are drowning are hanging on to a straw … I tried everything, and nothing is working".*

He has attended physiotherapy sessions and taken his medications. However, he is still convinced that he is unable to perform many simple daily activities, such as walking, because of LBP. He asked his doctor whether he could undergo surgery or not. His doctor advised him to do therapeutic exercises and avoid surgery. Emotional volatility therefore occurred as a result of the clash between their desire to be active and their inability to be active. Thus, many participants felt hopeless and in need of help from others. Their inability to perform certain functions made them dependent and reliant on help from other people. This hopelessness was seen to lead to despair, which, in turn, led the participants to surrender to the pain and accept it as part of the reality of their lives.

> *LBP 13 - 8: "I feel that I am depressed (because of this pain)…pain accompanies me and I am stressed at work … so I get depressed, you give up and surrender to the pain, so you can get things done".*

This hopelessness also made the participants with LBP seek out a quick cure regardless of the consequences that they might encounter later on; surgery was seen as a solution, with the only alternative being '*hanging to hope by a thread*'.

> *LBP 08 - 10: "I want to have an operation no matter what the outcome is, even if I am paralysed".*

A few participants reported that they felt hopeless and they believed that only surgical interventions would help them. This was later linked to the lack of knowledge and misunderstanding of the cause of LBP and the various interventions available to them to manage the LBP problem.

> *LBP 08 -10: "because of all the pain I have been through, ah I want to undergo a surgery…and get it over with".*

9.4.1.2.3 Anger [14]

Around 22 participants in this study described feeling angry because of not being able to perform various physical activities. They expected themselves to be able to work, look after their families and live the rest of their lives independently. However, physical limitations, fear of movements and failure to meet daily demands resulted in anger for some participants.

> *LBP 11 - 20: "I want to go to work, or get something done or go somewhere, can you see what I am talking about …I become nervous and yell at one of my children to do it for me".*

People with high levels of anger reported being easily agitated. A few participants expressed their concern regarding turning this anger on their families or those who were close to them within their social circle.

> *LBP 02 - 28: "Some time the pain severity makes you angry and you can't tolerate anything. You do not like anyone to talk to you. You ask people to leave you alone not to express your nervousness in front of them".*

9.4.1.3 The impact of LBP on social functioning

Many participants reported that LBP affected their social life (Table 9.4 and Figure 9.4), with some reporting that their family life was negatively affected by LBP. However, they felt that their families were supporting them and they were a source of comfort, empathy and motivation.

> *LBP 01 - 40: "My relationship with my wife is normal and I am really thankful to god. My wife understands that I am in pain and she supports me. She hoped that one day I will be cured".*

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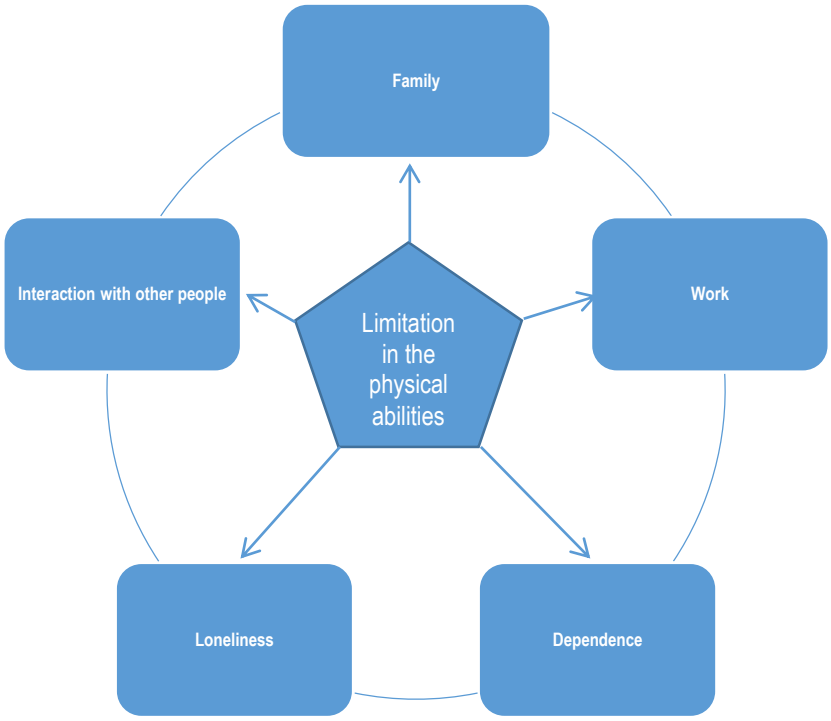
[14] Videbeck (402) defines anger as: "*a strong, uncomfortable, emotional response to a real or perceived provocation. Anger results when a person is frustrated, hurt, or afraid*".

Other participants indicated that their families were overprotective. This may be because those families were not provided with enough information about LBP. Alternatively, it may be due to the Arabic culture, where family members can be overprotective, especially with elderly people.

LBP 02 - 18: "I notice that when I try to lift something heavy, my children don't let me carry it. They help me. My husband asks me not to lift something because it will affect me, he also asks me not to go out even though that I enjoy walking".

Figure 9.4: The impact of the limitation in physical functioning on social functioning



Participants in this study said that they faced problems performing certain functions, such as going out and visiting other family members, because of the existence of pain in their lower back. Four of the older participants felt that they were unable to visit their sons and daughters, and carry their grandchildren, which left them feeling helpless and frustrated.

LBP 8 - 8: "I can't go shopping with my daughters. They ask me to come out but I can't. I can't walk. I can't visit them anymore. I feel that I am lying down on the bed all the day sleeping".

Participants expressed grief, indicating that these losses in their functional ability had negatively affected their productivity and made them dependent on other family members to help them with their daily activities. Furthermore, these losses in physical ability had negatively affected their sexual lives.

LBP 20 - 12: "I admit that this problem affected my sexual relationship with my wife. I can't have sex with my wife. I feel sever pain in the lower back".

Moreover, some participants described how avoiding meeting or interacting with friends, anxiety, depression and anger made them feel lonely. Some participants therefore limited their social interaction.

LBP 6 -13: "I don't like people to come and visit me. I try to avoid people and hope they will not visit me at all. They know that I don't like people to come and visit me. My sister stopped visiting me as they know that I can't stand up with them or sit down with them for a long period of time".

9.4.2 Subsection two: The experience of living with LBP

Participants said that maintaining their functional abilities is important to them. They had the desire to be normal, but at the same time they worried too much about preventing further damage to their body. Therefore, some participants took action to minimise the chance of doing something that would aggravate their pain in the future.

LBP 12 - 18: "The pain may strike all of a sudden…sometimes I walk with the fear that some lightening will strike down my back, and it will hurt…I take fearful short steps because I am afraid of the shooting pain".

People who took part in this study reported that the presence of LBP affected all of their daily activities. Thus, they identified some key strategies to 'self-manage' their LBP symptoms. Participants stated that they have become more vigilant to prevent aggravating their pain. Furthermore, participants said that they took medications to cope with their LBP problem.

9.4.2.1 Coping with pain

Participants identified some key strategies to cope with pain (Table 9.5). Taking medication and understanding their pain are two of these strategies which helped them to adapt and resume their life. It seemed that participants developed an understanding of the trajectory of LBP over time. Furthermore, the majority of participants pointed out that LBP is an incurable and recurrent condition. Some participants preferred to take analgesics when they felt pain and others preferred to be more active and do therapeutic exercises when they felt pain in the lower back.

LBP 6 - 43: "I don't like to come here because now I know how to manage this pain by myself, these exercises that I am doing".

9.4.2.2 Evaluating health status and determining life goals

Findings have illustrated how many participants reported that *pain* in the lower back affected their *physical abilities*. Thus, many participants (> 60%) consider restoring physical abilities or reducing pain as their main goals (Table 9.5). More than 25 participants consider evaluating their perception of pain and their ability to perform physical activity following physiotherapy sessions to be a key marker to monitor the success or failure of physiotherapy interventions.

9.4.2.3 Vigilance

Participants described a state of being constantly alert, anxious and vigilant. They tended to watch out and be careful all the time. Furthermore, patients' overall attitude was to avoid activities that could aggravate their pain (Table 9.5).

Generally, the majority of participants believed in the following statement: 'Prepare yourself, pre-load up on medications before you get moving and expect pain because it is going to strike and when it does, just quit*'.*

Such agitation forced patients to spend ample time and energy planning their movements and activities in advance in order to guard against any symptom aggravation.

9.4.3 Subsection three: LBP patients' knowledge about LBP

Participants' understanding of the cause of their problem, the consequences of having LBP and the source of information are three different factors that influence the management process for LBP (Table 9.6 and Figure 9.2). Participants' understanding of their own LBP problem seems to have a great influence on their potential participation in more physical activities. However, misconceptions, myths related to LBP and misleading advice to avoid physical activity tended to negatively affect LBP symptoms.

There were many sources of information which were identified by those who participated in this study (Table 9.6); however, some of these sources for the management of LBP were found to be contradictory. Participants described why they felt hopeless and failed to find anything to potentially stop the LBP affecting their life. They described how they tried traditional medicine and how it aggravated their symptoms and made them suffer more pain in their back. Respondents revealed that their hopelessness and despair left them vulnerable and willing to try different remedies, most of which rather aggravated their pains.

> *LBP 6 - 27: "People told me to see someone who treats patients using traditional Arabic medicine[15]. He caused me an increase of my pain and I was afraid to be disabled".*

It is vital to say that participants reported being confused due to the contradictory advice they received from their physicians about how to manage their LBP problem. Some physicians recommended undergoing surgery, and others asked patients to avoid surgery as much as they could and adhere to physiotherapy interventions.

> *LBP 8 - 10: "A doctor who is well known here in Amman told my daughters that physiotherapy will not help me. He said that it would decrease pain for a short period of time. He recommended a surgery for me. The doctor here in this clinic didn't recommend a surgery when he saw my neck images. Another doctor here asked me to sleep on my back for 40 days. If that didn't help me then I need to consider the surgery".*

[15] Traditional Arabic medicine is not related to the prophetic medicine.

Young participants expressed their concerns of losing career opportunities, early retirement or losing their current work because of these limitations in their functional abilities. They were fearful of the future, persistently questioning whether their pain would increase or they would improve.

LBP 22 - 16: "I am worried that I am still in young age … I didn't even start the practical real life. This problem affects the psychological part of my life. Sometime I can't do what my employer asks me to do. I am worried that I will not be able to continue to do this work in the future".

9.4.3.1 Spiritual beliefs around LBP

Participants reported that their spiritual beliefs play an important role in their life (Table 9.6). They thought that God would help them and they had complete faith in God to cure them. Some of those participants said that they did not have faith in physiotherapy or healthcare services. They completely relied on their relationship with God. Participants enthusiastically stressed the fact that their spiritual beliefs were a cornerstone in their lives. They believed that their unwavering faith in God was the only salvage, cure from pains and that no healthcare services could ever measure up to God's healing powers.

LBP 6 - 3: "I could not do surgery and I resorted to praying…I know that I have a strong relation with the Lord… I was confident that this relation will save me…and that I will be able to do this mission … doctors told me to go for surgery, otherwise I will be paralysed... but I resorted to the Lord".

9.4.4 Desired outcome

Generally, participants agreed that restoring physical functioning is an important life goal. They indicated that they monitor any changes in their health status by tracing changes in their physical abilities and their pain (Table 9.5). They clearly indicated that any success in their treatment will be reflected directly on their abilities to perform daily tasks and activities.

Table 9.5: The experience of living with LBP

Themes and Sub-theme	ICFDH code	Number (%)*	Participants' quotations	
Theme: Vigilance	b1300, b1263			Vigilance had negative impact on:
Preventing further deterioration	d175, d1751, b1266	19 (47.5%)	"*I look after myself to avoid any further deterioration*" (LBP36-18).	Function
Do it right	d177, b1266	13 (32.5%)	"*Right movement will help me and wrong movements will affect me*" (LBP28-20).	Function
Thinking before doing	d163, d177	18 (45%)	"*Now I think a thousand times before doing anything*" (LBP21-16).	Function
Hiding the problem	b1260	11 (27.5%)	"*I don't let other people know that I have back pain. I feel shy*" (LBP19-22).	Function, psychology, social life
Theme: Coping with pain				People used it to
Sub-theme: Medications	e1101	1(2.5%)	*"If I don't take these analgesics my pain will increase and I my health status will deteriorate, I will feel numbness and pain*" (LBP5-11).	Decrease pain and increase physical activities
Sub-theme: Adaptation	Personal factors	12 (30%)	"*I suffered for one month or one month and a half, and then I realised and understood that it [pain] is decreased. Don't forget that this pain experience is something normal with my life style. I adapted to this*" (LBP29-4).	Increase physical activities, work
Theme: Evaluating health status				People want to
Sub-theme: Restoring functions	Many codes (Table 9.3).	30 (75%)	"*This is the fourth session. I start to notice that physiotherapy helped me to be able to sit down and stand up again without a problem. I noticed that I will find problems in standing up following a long sitting. This is eased up. I noticed this*" (LBP18-26).	Increase their physical activities
Sub-theme: Reducing pain	b2801	25 (62.5%)	"*They asked me yesterday wither I am improving or not. I told her not. I felt severe pain in the right side of my body and in the bum. I went home yesterday with severe pain*" (LBP6-25).	Reduce pain to be able to perform activities of daily living

Table 9.6: Patient knowledge about LBP

Theme: Understanding					
1st level sub-theme	**2nd level sub-theme**	**ICF codes**	**Number (%)**	**Participants' quotations**	
Cause	Pathological problem		9 (22.5%)	"*At the beginning I thought that I have cancer, but when I did the MRI. The images showed that I have a problem between the fourth and the fifth vertebrae*" (LBP1-38).	
	Physiological change		5 (12.5%)	"*Firstly, I got married in a young age and the first pregnancy happened when I was 17. I mean at the age when your body is building up. I believe this and the difficult life circumstances are what caused me this pain*" (LBP8-2).	
	Nature of work		15 (37.5%)	"*the nature of my life and work require me to lift heavy objects … I suffered from this pain in the lower back after working like this for 7 years*" (LBP29-2).	
	Mechanical		9 (22.5%)	"*The problem started 10 years ago … when I tried to lift a heavy object … a gas heater. I tried to move it from one room to another … I felt severe pain in my back and that's what I believe caused my disc problem*" (LBP18-2).	
Consequences	Disability		27 (67.5%)	"*I am afraid of disability, to lose the ability to move around*" (LBP28-40).	
	Surgery		5 (12.5%)	"*I don't want to undergo a surgery. I want to avoid the risks of anaesthesia and surgery*" (LBP29-20).	
	Further deterioration		17 (42.5%)	"*What I am afraid of? … As I said, not to mention that I am getting older, I have five discs. I am afraid that my problem is deteriorating and my pain will increase*" (LBP19-52).	
Source of Information	Health professions	d115	31 (77.5%)	"*I went to a private doctor and he told me that I have inflammation*" (LBP17-8).	
	Family	d115	1 (2.5%)	"*One year between me and my sister, I mean we are approximately in the same age. She told me that nothing helped her except hydrotherapy and the things that they ask us to do in it*" (LBP17-36).	
	Friends	d115	9 (22.5%)	"*I asked other people who did the surgery if they recommend it or not*" (LBP02-20)	
	Internet/Media	d166, d110	3 (7.5%)	"*I mean I read a lot of these articles which talk about spine problems in newspapers or magazines. I read anything which is related to the spine, pain in the back or these problems related to the spine deviation. I also watch these TV shows which invite speakers who are specialists in the spine. I like to watch these shows. I want to understand what going on with me. What cause me this pain? I mean they have mentioned a lot of these symptoms which is similar to my symptoms*" (LBP2-32).	
Theme: Spiritual beliefs					
This is my destiny		d9300	10 (25%)	"*Although I have severe pain, but this is God's will and again praise is to Allah…This is my life and I should accept God's will*" (LBP1-6)	Psychology, understanding
God will help me		d9300	23 (57.5%)	"*Our hope in God not in physiotherapy…it is God's will*" (LBP17-24).	Psychology, understanding

9.5 Discussion

Previous studies have pointed out that the majority of episodes of LBP are self-limited (403,404). However, the recurrence of LBP is very common (104,403). All of those who took part in this study indicated that they had experienced several episodes of LBP in the past. Thus, they were considered to have chronic LBP within this context. The inclusion of people who have chronic as well as acute LBP might provide a sample with richer experience about the impact of LBP on people's life.

The findings indicate the complex impact of LBP on individuals' physical abilities, psychological status, social functioning, and spiritual practice. This study also focused on identifying life goals that were important to individuals with LBP following physiotherapy management in order to develop a valid, reliable and culturally sensitive measurement tool for individuals with LBP in Jordan within the next sections of this research programme.

9.5.1 The impact of LBP on physical abilities

Participants said that they had the desire to be normal, but, at the same time, they worried about preventing further damage to their body. The findings of this Jordanian qualitative study suggested that participants saw their body as fragile and were scared to participate in many physical activities and further increase the damage to their body structures. These concerns of preventing further damage to a fragile body were also reported by Stenberg *et al.* (405), who conducted a qualitative study with people who had LBP. Stenberg *et al.* (405) indicated that fear of increased damage led to vigilance regarding physical activity, resulting in a preference for rest and being cautious when starting to exercise. Miles *et al.* (406) proposed that in chronic LBP, the body becomes the object of an activity instead of the means through which this activity was achieved.

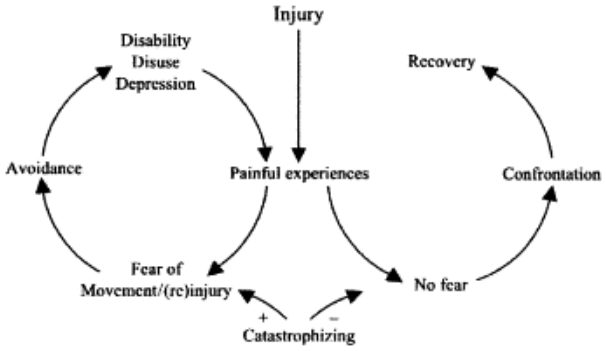
9.5.2 The impact of LBP on psychological status

This Jordanian qualitative study reported that fear of movement made participants take actions to minimise the chance of doing something that would further damage their body and, consequently, aggravate their LBP symptoms in the future. Physical restrictions associated with LBP, the uncertainties about the cause, or the course of the LBP problem affected individuals' psychological state. These restrictions in their physical abilities and

doubts around their future were described as leading to depression, anxiety and anger (407,408). Furthermore, anxiety was linked to fear of movement and hypervigilance[16] (407,410).

Previous studies showed that hypervigilance is directed towards the intention to avoid physical movement and escape situations that require a high level of physical abilities. A helpful treatment option may be to challenge false beliefs about pain and to enhance individuals' understanding that a meaningful life is possible despite pain (411,412). Vlaeyen and Linton (413) developed a model where the pain beliefs and experience lead to two contrasting behavioural responses: avoidance or confrontation of reality (Figure 9.5). Fear of movement was a component of avoidance behaviour which led to less physical activity, aggravating pain symptoms, deconditioning[17] and disuse of the body, and disability (Figure 9.5). On the contrary, confrontation with the fear of movement directly, towards less fear of pain, decreased pain over time. These findings were similar to the findings in this qualitative study.

Figure 9.5: Cognitive-behavioural model of fear of movement/(re)injury



The model proposed by Vlaeyen and Linton (413) showed that pain catastrophising[18] may serve as a precursor of pain-related fear of movement. Therefore, the identification of catastrophic cognitions is important in order to prevent the development of chronic pain, fear-avoidance behaviours, depression and, consequently, disability (411).

[16] Mackworth et al. (409) defined vigilance as "*the predisposition to attend to a certain class of events, or the readiness to select and respond to a certain kind of stimulus from the external or internal environment*".
[17] Gillis et al. (414) define deconditioning as "*a complex process of physiological change following a period of inactivity, bedrest or sedentary lifestyle*".
[18] "*Although the defining criteria for catastrophizing have never been explicitly stated, there is general consensus that catastrophizing involves an exaggerated negative orientation toward noxious stimuli*." (Sullivan et al.(415).

9.5.3 The impact of LBP on social life

This current study suggests that limitations in functional abilities also affected personal relationships and interactions with other people. These findings were also consistent with the findings of a recent qualitative study by Hawthorne *et al.* (416), who proposed that social isolation associated with LBP could lead to many problems, such as maladaptive responses, work loss, being tense with others, and sexual dysfunction. Men who took part in this study said that they were more willing to tolerate their LBP symptoms caused by their occupation and hide their pain from others. It seems that they tolerated their pain because this was linked to their social role as a reliable employee and breadwinner. This finding is supported in a study where men also reported that they were willing to tolerate pain caused by their work because this was connected to their social role as a dependable worker and breadwinner (417). A study by Ashby *et al.* (386) reported that these limitations in individuals' physical abilities could lead to financial constrictions, social isolation, and the desire to hide the LBP symptoms from others. Furthermore, it seems that depression and hypervigilance may affect social relationships and lead to social isolations (386).

The findings of this study indicated how fear of movement could lead to limited participation in social activities and this, in turn, negatively affects relationships with their spouse, children and friends, all of which are the basis for individuals' coping and support. These changes might lead to relationship breakdown, which, in turn, might cause more social consequences (418). Therefore, attention has to be directed towards the complicated interactions between individuals and their social context in how the fluctuation patterns deeply rooted in their LBP problem shape the oscillation between hope and despair (407).

9.5.4 The impact of LBP on spiritual practice

Participants indicated that anxiety, caused by LBP, challenged their self-confidence to perform usual daily activities, such as praying. Bandura (419,420) suggested a model where self-efficacy or self-confidence was hugely dependent on individuals' abilities to perform various tasks or meet specific situational demands (Table 9.7). The existence of pain or the apprehension of pain due to performing an activity that might aggravate the LBP symptoms could negatively affect self-confidence to maintain a position or perform

dynamic movements. This was also reported in a study where individuals reported that LBP challenged their self-confidence to perform their spiritual practices, which require individuals to maintain a position for a certain period of time or perform different dynamic movements (421).

Table 9.7: Summary of models used in this chapter

Model	Author	Definition and explanation
Fear-avoidance model	Vlaeyen (413)	This model emphasizes the importance of fear that physical activity will cause pain and (re)injury
Self-efficacy model	Bandura (14,15)	"*to an individual belief in his or her ability to perform certain physical tasks or meet specific situational demands*."
Sense of coherence model	Antonovsky (422), p.19	"*a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that:* *The stimuli deriving from one's internal and external environments in the course of living are structured, predictable and explicable; the resources are available to one to meet the demands posed by these stimuli; and these demands are challenges, worthy of investment and engagement.*"

9.5.5 The impact of patients' knowledge on the rehabilitation process

Fear and avoidance attitudes have been linked to erroneous and extraneous beliefs, which led to fear of movement or kinesiophobia[19] (386). It seems that early in the LBP experience, individuals quickly identify those movements that aggravate their LBP symptoms and accordingly avoid such movements (386). Fear of movement could be due to an incorrect interpretation by the individual of the cause of LBP (424,425). Examples of such incorrect beliefs held by participants in this qualitative study were that a past injury could lead to damaging intervertebral discs. People believe that only surgery could fix the back pain problem or, most often, they believe that staying active could be the cause of potential further damage to the intervertebral disc, which leads to more pain and to paralysis. Participants who took part in this study had incorrect beliefs and explanations regarding the cause of their LBP. This lack of an explanatory model that tells them what is wrong with their back and their spine might significantly influence the rehabilitation process (426). Therefore, participants' experiences indicate that it is recommended that healthcare professionals working in this setting explore individuals' knowledge. Patients' knowledge is not static and will be influenced by the source of information, individuals' beliefs and their interpretations of information passed to them by others (386). Avoidance behaviour and pain-related anxiety could be reinforced by advice from family members, colleagues, friends, and even therapists about the cause of

[19] "*An irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or (re) injury*." Kori et al. (423)

pain and how to terminate the LBP problem (427-430). These interpretations had become part of the participant's own explanatory model of LBP. Furthermore, the misunderstanding of the medical language accentuates the need to confirm understanding with the individual who suffers from LBP. The early identification of misunderstandings, fear of movements and its impacts could help health professionals to achieve better outcomes and the process of rehabilitation will be more effective (386,426).

9.5.6 Self-management and coping with pain

It appears that individuals' knowledge and their understanding of the LBP problem help them to enhance their ability to cope with pain. Antonovsky (422) developed the sense of coherence model in 1979; he indicated in his model that individuals who cope with life stressors have a good understanding of their problem. Usually, individuals seek to be in control of their problem and try to find explanations of things that are happening to them. Furthermore, in his model, Antonovsky stated that comprehensibility, manageability, and meaningfulness are three key components to a successful coping strategy. The last component, meaningfulness, is the most important key factor in this model because individuals can only successfully self-manage their condition and cope with pain if they are working to achieve a meaningful and important life goal. This notion supports the overall aim of this thesis of developing a measurement tool that generates meaningful information that might help individuals with LBP to learn more about their problems and self-manage them.

9.6 A reflection on the qualitative study

This subsection reflects on the conduct and process of the qualitative study. It highlights aspects of the study which might have impacted upon the rigour of the findings. The majority of those who agreed to participate in this study engaged in the interview and responded to all questions. However, some issues emerged during the period of data collection which required being addressed to avoid any negative effect on the quality of the data gathered. During the recruitment stage, three participants initially agreed to participate in the qualitative study; however, they changed their mind later on prior to the commencement of their interviews. Two participants indicated that they were busy and did not have time to be interviewed. One participant refused to have the interview audio-recorded and later requested a withdrawal from the qualitative study.

The interviewer made all efforts to ensure that during the recruitment stage, each participant understood that participation in this study was completely voluntary and each participant had the right to withdraw from the interview, even without giving a reason; however, no one decided to withdraw. Each participant was given an information sheet two weeks prior to the interview. These information sheets explain the purpose of the study, the role of the participants and their rights before, during and after the interviews.

Some participants approached the interviewer following the completion of the interviews and expressed their concerns with regard to the quality of their treatment. Allmark *et al.* (431) conducted a review about the ethical issues during the in-depth interviews. This review recommends that interviewers disclose their professional background to the interviewees and resist any temptation to switch between the research and therapy during the data collection phase.

Participants were assured that this study was conducted for research purposes and was not related to their therapy. The interviewer had taken patients' concerns into consideration and stressed within each of the interviews that participation within this study would not affect the quality of the treatment, either positively or negatively. Participants were assured that their concerns would be included in the final report of this qualitative study. Participants were informed at the beginning of the recruitment stage that the overarching goal of this study is to develop an outcome measure that might assist them and their healthcare providers to take evidence-based decisions during their therapy. This evidence-based practice will enhance the overall quality of healthcare services provided to them.

Another important issue was related to the furniture available within the interview room. One of the participants indicated that sitting down would increase his pain and he preferred to be interviewed while he was lying down on his back in one of the closed treatment rooms within the hospital. A room was booked for the purpose of this interview. However, the main researcher took into consideration that some of the participants might feel uncomfortable while sitting down for a long period of time to be interviewed. This had an impact on the focus of the interview, as participants might have ended up being preoccupied with sitting as something that aggravates their pain. Thus, each participant within the following interviews was asked if he/she wanted to take a break and perform some stretching or exercises.

Participants were encouraged to talk about their personal experiences of living with LBP. Some of the participants focused on their negative experiences. The majority of those participants provided an extensive and moving account about the impact of LBP on their physical abilities, social life, mood and spiritual life. Some of those participants became upset and distressed when they were talking about the impact of LBP on their life. The review by Allmark *et al.* (431) suggested that the interviewer should plan strategies in advance to deal with these stress situations. The interviewer reflected on his clinical practice as a registered physiotherapist; these issues were easily addressed and settled. This did not significantly affect the thread of the discussion and participants returned to talk about their experience with LBP with less emotional distress. Notes were written during the interviews to avoid repetition, to document the points discussed throughout the interview and to maintain the thread of the discussion. The interviewer assured those participants that their identity would be kept confidential throughout the research. Richards and Schwartz (432) pointed out that maintaining confidentiality is important while conducting a qualitative study and later on during writing up the final report. Therefore, pseudonyms were used in this qualitative study.

All efforts were made to keep the participant focused, in order to be able to discuss their lived experience with LBP. However, some of those participants indicated that they suffered from other chronic problems in their spine, such as neck pain. The main researcher gently asked them to focus on LBP in their discussion.

Finally, there were extra layers of translation in this qualitative study. The accuracy of the translation process might affect responses of participants or lead to unintentional omission of certain words that might be important later on in the items construction stage. This was taken into consideration and this research programme followed the instructions of two translation guidelines in order to preserve words and expression reported by participants. Two researchers were involved in the translation process and the two reviewers from the University of Jordan reviewed more than 50% of the translated quotations and they recommended minor changes to the English text to preserve meanings. The reviewers concerns were related to the word selection. It is important to note at this stage that even though text was translated from Arabic into English, this research programme only used the Arabic text in the construction stage of the TELER indicators. Therefore, this was not considered an issue that might affect the development phase. This subsection indicates that a variety of steps were taken to i) enhance the clarity

in describing the research process and ii) maintain the rigour of this study.

9.7 Examining the quality of this study

The criteria of trustworthiness were used in this research (Table 9.2). The following subsection describes in detail how ethics of research, credibility, transferability, dependability and confirmability were achieved in this qualitative study.

Ethics: This qualitative study was approved by the Sheffield Hallam University Research Ethics Committee (Appendix F), the Jordanian University of Science and Technology Hospital (Appendix G) and the Jordanian Ministry of Health Ethics Committees (Appendix H).

Credibility: Semi-structured interviews were used in this study, which meant that the interviewer was not tied to the topic guide. The topic guide assisted only as a beginning point from which to start discussion of the subject. This enabled exploration of the participants' views about the impact of LBP on their lives as they arose, the discovery of which was the main aim of this research. Credibility was improved by extended involvement in data collection and analysis. In order to avoid any biases of the interviewer influencing the analysis, the development of the themes went through the five stages of framework analysis. At each stage, the researcher scanned the data and evolving themes were examined against them, as was described in the methods. While this was happening, the data analysis was exposed to the supervisory team so that 'quality control' occurred.

Transferability: In order to provide triangulation, respondents were from four hospital sites. Participants were only LBP patients with dominance of chronic problems. Demographic details were given in Table 9.3.

Dependability: The fact that the interviewees knew that the researcher was not involved in their management might have helped them to be more comfortable to talk about their experience of living with LBP. As outlined previously, the data analysis was examined and re-examined by the author of this thesis and the supervisory team to ensure that the themes identified were exhaustive and thorough. Good qualitative research should be in tune with previous studies (433); other qualitative studies reported similar findings and there was no contradiction between this research and other studies, thus endorsing the reliability of the current study. However, this qualitative study provided more themes,

such as the ones related to spirituality and sources of information, which was not reported by other studies.

Confirmability: The majority of those who were invited agreed to take part in this study. It is, therefore, logical to assume that they represent a variety of perspectives, a range of participants and that they resemble the targeted population. Furthermore, there were equal numbers of male and female participants, avoiding over-representation of one group. As outlined earlier, this study followed a structured research process and the conclusion was warranted by the data. Within the limits of the resources available, everything was carried out to ensure a credible, dependable, transferable and confirmable collection and analysis of the data that the participants offered.

9.8 Strengths and limitations of the qualitative study

This study has a relatively large sample size in comparison to other qualitative studies and research in a similar area (5,366). This point was considered one of the strengths of the study because it allowed the inclusion of a more diverse sample, which enabled the exploration of similarities and differences between diverse participants and those from four different regions. This study followed a structured approach not only in the analysis of qualitative data but also in the process of translation, which adds to the strength of this study.

Despite all efforts to enhance the quality of this research, there were some limitations. For example, this study was limited to individual interviews and did not utilise other methods of data collection, such as focus groups. A focus group might provide a broader range of information and different insights into a complex problem in comparison to semi-structured interviews. However, it was difficult to encourage a range of participants to take part in a focus group because they were busy with other commitments. Furthermore, it is logical to assume that participants who were recruited from the same physiotherapy clinic knew one another and that it would impede their contribution in answering the research questions (389,390).

Due to the nature of this research and the large sample size, participants were not asked to validate their transcripts, which could be considered one of the limitations of this research. However, towards the end of each interview the researcher gave each interviewee a short feedback summary of what they said in the interview to confirm that

the points mentioned in the interview represent their view and experience of living with LBP. Compared with a suggested checklist by Seale (434) for evaluating the quality of qualitative study, this study performs reasonably highly.

9.9 What this qualitative study add to the current LBP literature

The findings of this study fit with the concepts of the bio-psychosocial model (435,436). However, this study showed that spiritual life was also affected by LBP and recommends adding this dimension to the existing bio-psychosocial model. Individuals with LBP said that their spiritual life was important to them and made them cope with LBP. This study is the first to provide in-depth details about the impact of LBP on physical activities. It appears from the findings of this study that limitations in functional abilities affect other dimensions of the LBP experience, such as mood, social functioning, and praying. Furthermore, the findings showed that many activities, such as squatting, kneeling, and being prostrate, were affected by LBP. Current commonly used measures of function do not address such activities adequately (210). The findings of this study also supported the concepts of the cognitive-behavioural model regarding fear of movement/(re)injury (413). The study findings indicate that individuals' knowledge could influence people's ability to perform different physical activities. It seems that any misconception about what causes the LBP problem or any misunderstanding of the medical language could strengthen avoidance behaviours and lead to fear of movement. Therefore, this study emphasises the need to verify that patients do not have misconceptions or misunderstandings before the beginning of the rehabilitation process in order to avoid any negative impact on rehabilitation.

The findings of this study make an important contribution of understanding LBP patients' perspectives by exploring and identifying their life goals. The author of this thesis is not aware of any study that explores life goals that are important to individuals with LBP. This is the first qualitative study in Jordan to explore LBP patients' perspectives and identify their life goals in order to design a measurement tool suitable to be used with Jordanian individuals who complain about LBP in a clinical setting.

9.10 Conclusion

This qualitative study makes an important contribution to understanding the complexity of the LBP experience as a pre-cursor to the development of a culturally sensitive clinical outcome measurement tool for individuals receiving physiotherapy management for LBP. This qualitative study showed that LBP has a huge impact on an individual's ability to perform different daily activities, especially sitting, standing, lifting, bending and rotating the trunk. It is clear from the participants' narrative that restoring functions is a key feature to the success of therapy. Fear of movement due to individuals' erroneous beliefs around the cause of their LBP problem and their misinterpretations of the medical language led to kinesiophobia. The findings support the need to develop a measurement tool for individuals with LBP which reflects changes in their physical abilities. The tool also needs to take into consideration that patients' knowledge plays a key role in preventing fear of movement and associated behaviours. Knowledge can help individuals to cope with pain, self-manage their condition, and continue their life. Therefore, the physical functioning theme and subthemes that emerged from this qualitative study will form the basis of TELER's physical functioning indicators in the next section of this research programme.

Chapter 10: Combining outcome components into one measure – generating TELER codes from patients' narrative

Key point in Chapter 10:

- The TELER LBP indicators were constructed using the findings of the qualitative study, along with scientific and clinical knowledge. The Nominal Group Technique ensured face and content validity of the TELER LBP indicators.

10.1 Introduction

Findings of the qualitative study [Chapter 9] indicated that LBP significantly affects many dimensions related to a patient's quality of life. It seems that LBP affects a patient's functional performance and leads to many limitations in social participation, ability to work and spiritual practice. Furthermore, the qualitative study suggested that these limitations in functional performance might lead to depression, anger and fear of movements.

It appears from the findings of this study that individuals with LBP were concerned about their physical functioning. This was confirmed in a recent qualitative study conducted in Australia which explored individuals with LBP goals after physiotherapy (363). Gardner *et al.* (363) suggested that goals related to physical functioning were identified by individuals with LBP as important after physiotherapy. Therefore, the following subsections aim to describe the process of identifying and formulating the TELER codes for each physical activity identified from the findings of the qualitative study.

10.2 Item selection

Findings of the qualitative analysis identified two sets of activities that were challenging and important at the same time to individuals with LBP. These sets were maintaining a posture for a certain period of time and dynamic movements. These activities were further divided as follows:

Set 1: The maintenance of a position (static posture):

- Lying down
- Sitting
- Standing
- Squatting
- Bending forward

Set 2: Changing position (dynamic movements):

- Rolling in bed
- Getting out of bed
- Lying down to sitting
- Sitting to standing
- Standing to walking
- Standing to pending forward
- Standing to squatting
- Walking
- Running
- Going up stairs
- Going down stairs
- Lifting weights

10.3 Generating item codes

The next step after identifying the 'desired outcome' was to generate TELER codes for each of the TELER indicators. A first draft of TELER codes was generated from:

- Patients' narratives
- Movement analysis studies
- Clinical knowledge
- Experts' opinion

The process of generating TELER codes involves standardising and refining codes' descriptors to conform to the requirements of the TELER method of measurement (342). These requirements are as follows:

1. Each TELER code must have a unique meaning.
2. The language used in a TELER code's descriptor must provide a singular meaning. This is achieved by ensuring that each statement in a TELER code's descriptor means one thing and is not perceived differently by different individuals.
3. A standardised language must be used in the formulation of the codes' descriptors to allow for a wider application.
4. Statements that rely on feelings must be avoided and replaced by observable characteristics.
5. Codes provide an ordinal level of measurement. This is important to ensure that codes represent as closely as possible the different stages of the recovery process.

Tables 10.1, 10.2 and 10.3 show some examples of using different approaches in the development of TELER codes' descriptors.

Table 10.1: An example of how a TELER [generic activity] functional indicator was constructed from LBP patients' narratives

Participants' quotation	TELER code's descriptor
LBP 28-20 "*I can't turn my trunk around to the right or to the left because of this pain*".	**Code 0:** Pain prevents *named activity*
LBP 28-10 "*This [LBP] will limit your abilities to use your legs, you can't walk or move around*".	**Code 1:** Pain interrupts *named activity*, unable to resume
LBP 28-30 "*I can't stand up quickly if I am lying or sitting down at home, you feel as there is a spasm in your leg. However, this pain will go away once I warm up … the pain becomes less … much less*".	**Code 2:** Pain interrupts *named activity*, able to resume
LBP 26-62 "*I feel it [pain] while I am getting out of the car, and when I step down from the car, continuously, when I'm handing out the [news]papers as I told you, every morning, it increases with movement*".	**Code 3:** Pain during *named activity*, able to continue without interruption
LBP 12-04 "*no problems while I am sleeping but I can't move my back when I first get up in the morning, I need some time to be able to move about*".	**Code 4:** Pain after completion of *named activity*
LBP 21-18 "*In fact, I don't feel pain at all when I run*".	**Code 5:** Pain free throughout *named activity*, no pain after

Table 10.2: An example of how a TELER functional indicator was constructed from movement analysis study

Movement analysis of sitting to standing	TELER codes	TELER code's descriptor
	Code 0	Unable to stand from sitting
	Code 1	Able to forward flex trunk
	Code 2	Able to forward flex trunk, shift bottom to edge of chair and transfer weight over feet
	Code 3	Able to initiate push up from chair
	Code 4	Able to rise from chair using hands
	Code 5	Stands independently from sitting without using hands

The sequence of events described in this table is reported by many movement analysis studies, such as Millington et al. (437) *and Schwenk* et al. *(438).*

Table 10.3: An example of how a TELER LBP component indicator was constructed from clinical knowledge

I have difficulties to maintain the following positions for [*specify time*]:	TELER code	TELER code's descriptor
Lying down on back	Code 0	All problems present
Sitting	Code 1	4 problems present
Standing	Code 2	3 problems present
Squatting	Code 3	2 problems present
Bending forward	Code 4	1 problem present
	Code 5	0 problems present

The TELER codes in Tables 10.1 and 10.2 were very similar to the codes in existing TELER indicators (WC0051 and ST0278, respectively), which are located in the TELER online library (439). The TELER online library contains more than 1400 indicators that were validated by different qualitative studies and expert panels in the healthcare field (440). These indicators measure various dimensions of health-related quality of life, including the impact of pain on physical functioning. It is logical to assume that this online library might include indicators relevant to this research programme, ready to be modified according to the findings of the qualitative study and validated by expert in the next stages in this research programme.

The TELER library was searched manually and electronically for indicators that could be potentially used with individuals with LBP. These indicators were examined and checked to ensure that they were appropriate to be used in the measurement of functional performance. The selected indicators were continuously compared to the findings of the qualitative study. The purpose of this comparison was to ensure that the selected indicators reflect desired outcomes that are important to individuals with LBP in Jordan.

In total, 36 physical functioning indicators were identified from the TELER online library and were extracted to a Word® document [Appendix I]. Each of these indicators was individually examined to check whether it contradicted the findings of the qualitative study or not. Any indicator located in the TELER online library which contradicted patients' narrative was excluded from the validation stage [Chapter 11]. The author of this thesis literally translated the first draft of TELER LBP indicators from the English language to the Arabic language in preparation of being validated by experts in the next stage [Appendix J]. The Arabic standard language was used in the translation to allow for a wider application in Jordanian physiotherapy clinics.

10.4 Conclusion

The first draft of the TELER LBP indicators represented a wide range of activities that were identified earlier in a qualitative study as important to individuals with LBP. The initial pool of indicators was prepared to be validated using the consensus method in the next stage of this research programme. The next chapter describes the methods used to validate the first draft of TELER physical functioning indicators.

Chapter 11: Item calibration and validation of TELER LBP indicators – Expert validation

Key point in Chapter 11:

- The nominal group technique used in this chapter facilitated the process of identifying issues in the pre-testing version of the TELER LBP indicators. The participants suggested few changes in the pre-testing version to enhance the readability of the indicators, omitting some indicators that did not represent the construct 'physical functioning' and replacing them with other indicators.

11.1 Introduction

Thirty-six indicators were selected in the previous stage to form the first draft of the TELER LBP questionnaire. The selected indicators included different response choices that match, as closely as possible, different stages of the recovery process. The aim of the following subsections is to describe the methods used to refine, standardise and validate the TELER LBP indicators by Jordanian experts in the field of physiotherapy.

11.2 Methods

A consensus method was adopted in this stage in order to scrutinise and validate the first draft of the TELER LBP questionnaire. Consensus methods are typically used in health services research for problem identification, development of solutions and establishing priorities (441,442). Four methods of consensus are often used in the health services research (441). These are the Delphi approach, focus groups, brainstorming sessions and nominal group technique (NGT) (also known as expert panel technique). Table 11.1 presents a comparison between these methods.

Table 11.1: A comparison of group decision-making processes

Attribute	Decision-making process			
	Delphi	Focus groups	Brainstorming	NGT
Face-to-face group meeting process	No	Yes	Yes	Yes
Generates a large number of ideas	Yes	Maybe	Maybe	Yes
Avoids focusing on a single series of thought	Yes	Yes	No	Yes
Encourages equal input from all participants	Yes	No	No	Yes
Highly structured process	Yes	Maybe	No	Yes
Allowing participants to change their opinions	Maybe	No	No	Yes
Avoids 'quick' decision-making	Yes	No	No	Yes
High degree of task completion	Yes	Maybe	No	Yes
Provision of immediate feedback	No	Maybe	Maybe	Yes
Measures the relative importance of ideas generated	Yes	No	No	Yes
Generate consensus	No	No	No	Yes

Adapted from Potter et al. *(441)*

The comparison in Table 11.1 indicates that the nominal group technique (NGT) can provide a systematic method and environment to facilitate discussion, constructive criticism and improvement to the translated TELER LBP indicators. Thus, the NGT was selected as more appropriate for use in this research than the other consensus methods. Box 11.1 shows the NGT protocol that was followed in this research programme.

Box 11.1: The nominal group technique protocol

1. Introduction and explanation: The facilitator welcomed the participants and explained the purpose and procedure of the meeting. This included an oral presentation of the TELER method [~15 minutes].

2. Silent generation of ideas: The facilitator provided each participant with a sheet of paper with the question to be addressed and asked them to write down all ideas that came to their mind when considering the question. During this period, he asked participants not to consult or discuss their ideas with others [~5–10 minutes].

3. Sharing ideas: The facilitator invited participants to share the ideas they have generated. The facilitator recorded each idea on a PowerPoint® slide using the words spoken by the participant. The round-robin process continued until all ideas were presented. There was no debate about items at this stage and participants were encouraged to write down any new ideas that might arise from what others shared. This process ensured that all participants got an opportunity to make an equal contribution and provided a written record of all ideas generated by the group [~15–30 minutes].

4. Group discussion: Participants were invited to seek verbal explanation or further details about any of the ideas that colleagues had produced that might not be clear to them. The facilitator's task was to ensure that each person was allowed to contribute and that discussion of all ideas was thorough without spending too long on a single idea. It was important to ensure that the process was as neutral as possible, avoiding judgment and criticism. The group suggested new items for discussion and combined items into categories, but no ideas were eliminated [~30–45 minutes].

5. Voting and ranking: This involved prioritising the recorded ideas in relation to the original question. Following the voting and ranking process, immediate results in response to the question were available to participants, so the meeting concluded having reached a consensus.

Consensus was considered to be reached if a certain format received the most votes.

Adapted from Potter et al. (441).

The NGT was used in this research programme in order to achieve the following objectives:

- To review the translated version of the selected TELER indicators from English to Arabic.
- To validate the modified TELER's indicators. This was achieved by examining the construct, the content, and the clinical knowledge underpinning the TELER's functional indicators.
- To ensure that the codes in the indicators are representing clinically significant outcomes that are induced by physiotherapy interventions.
- To ensure that the hierarchical stepwise regain of physical abilities in TELER's indicators is a valid representation of improvement (or deterioration) in physical functioning.

11.2.1 Sampling

Purposive sampling was used in the recruitment of the expert panel. Individuals who met the inclusion/exclusion criteria were invited to take part in the NGT meetings (Table 11.2). Purposive sampling was selected because, in comparison to other methods such as convenience sampling, purposive sampling allows participants to be recruited in a strategic manner that befits the research goals (390). Selecting purposive sampling was important in order to achieve a wide range of different expertise and experiences required to inform the development of the TELER LBP indicators.

Physiotherapists who were identified by the Jordanian Physiotherapy Society as experts in the management of LBP and met the inclusion and exclusion criteria (Table 11.2) were invited to take part in the nominal group meeting. A letter [Appendix K] explaining the aim of the research was sent to the selected physiotherapists. Participants were given one week to indicate whether or not they were interested in taking part in the NGT. The invitation letter included a mobile phone number that the participant could use in case they wanted more information or wanted to reply to the invitation letter. Once the participants agreed to take part in the study, they were sent the original version, the translated version of the first draft of the TELER LBP questionnaire and a questionnaire to assess the validity of each TELER LBP indicator [Appendix L], as well as the information sheets and consent forms [Appendix M]. They were asked to review and document their comments and suggestions on the translated version. Those who did not respond to the invitation letter through a phone call were approached one week later and were asked whether they would be willing to consent to take part in the scientific meeting or not.

Table 11.2: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
• Practicing musculoskeletal physiotherapists to represent typical practice. • Participants must have at least three years of experience in the management of LBP. This is important to ensure that the participants have an adequate knowledge about LBP and the trajectory of the condition. • Willing to participate voluntarily in this research.	• Unable to communicate in Arabic or English languages.

11.2.2 Confidentiality

The researcher followed Sheffield University protocols regarding confidentiality issues and complied with the requirements of data protection (443). Confirmation was given to participants that any given data would be coded so that their privacy was maintained throughout the study. In addition, information sheets clearly stated that electronic data, such as audio recordings, would be kept on a secure laptop using a complex password and that the laptop would not be left unattended at any stage. Field notes taken during the study were kept in a locked briefcase or a secure locker at the researcher's living place.

11.3 Results

Eighteen physiotherapists were invited to take part in this stage. Twelve physiotherapists agreed to take part in the validation stage. Table 11.3 shows the field of expertise and years of experience for each participant. The last two physiotherapists in Table 11.3 acted as facilitators in the NGT meetings; therefore, their votes were not included in the final voting round. Furthermore, the LBP-11 field of expertise lay in the pulmonary rehabilitation field and not musculoskeletal physiotherapy. Physiotherapists who agreed to take part in this stage scrutinised the first draft of the TELER LBP indicators in one of six sessions over two weeks. These sessions lasted between one and four hours.

Table 11.3: Expert panel characteristics

Participant number	Field	Years of experience	Place of work
LBP-01	Musculoskeletal physiotherapist	23 years	Al Bukhari Center
LBP-02	Musculoskeletal physiotherapist	5 years	Islamic Hospital
LBP-03	Musculoskeletal physiotherapist	4 years	Spine Care Center
LBP-04	Musculoskeletal physiotherapist	4 years	Spine Care Center
LBP-05	Musculoskeletal physiotherapist	3 years	Spine Care Center
LBP-06	Musculoskeletal physiotherapist	3 years	Spine Care Center
LBP-07	Musculoskeletal physiotherapist	4 years	Physio Medic Center
LBP-08	Musculoskeletal physiotherapist	9 years	Red Cross and Red Crescent Societies
LBP-09	Musculoskeletal physiotherapist	3 years	Altamiouz
LBP-10	Musculoskeletal physiotherapist	9 years	Albashir Hospital
LBP-11	Academic with TELER method experience, Physiotherapist	5 years	The University of Jordan
LBP-12	PhD student with TELER method experience; Musculoskeletal physiotherapist	2 years; 7 years	The University of Sheffield

The initial results of the voting stage are presented in Table 11.4, which indicates that experts were able to identify concerns regarding a number of indicators. These concerns

were regarding the complexity of language, which might compromise clarity. Other concerns were the inclusion of concepts that are not relevant to the domain of physical functioning and the inclusion of physical activities that cannot be induced by physiotherapy interventions alone. A full list of their recommendations and suggestions is presented in Appendix N.

Table 11.4: The initial results of the votes in the nominal group technique

Title of the TELER indicator	Q1*			Q2*			Q3*			Q4*			Q5*		
	Y	D	N	Y	D	N	Y	D	N	Y	D	N	Y	D	N
1. General function (not hierarchical)	5	0	5	4	0	6	4	1	5	1	3	6	1	3	6
2. Pain free activity	9	0	1	0	1	9	1	0	9	1	0	9	1	0	9
3. Independent toileting	1	1	8	0	0	10	8	0	2	3	0	7	1	0	9
4. Washing independently	1	4	5	2	2	6	5	1	4	3	3	4	5	1	4
5. Return to sporting activity	8	0	2	0	0	10	2	0	8	2	0	8	1	0	9
6. Sciatic referral anaesthesia, pain, paraesthesia	4	1	5	2	1	7	5	1	4	4	1	5	1	1	8
7. Ability to perform functions after the onset of lower back pain	1	6	3	1	6	3	3	5	2	0	7	3	1	5	4
8. Sleep without disruption due to pain	8	0	2	0	2	8	2	0	8	0	0	10	0	0	10
9. Sleep normally (not hierarchial)	8	1	1	0	1	9	0	1	9	0	1	9	0	1	9
10. Sleep pain free	7	2	1	0	3	7	1	2	7	0	4	6	0	0	10
11. Bed mobility	7	0	3	2	0	8	3	0	7	0	0	10	0	0	10
12. Lying to sitting over edge of bed	8	0	2	0	1	9	2	0	8	0	1	9	0	1	9
13. Lying to sitting on bed	3	3	4	1	1	8	4	0	6	1	1	8	1	1	8
14. Get out of bed (not hierarchial)	6	1	3	1	0	9	3	0	7	1	1	8	0	1	9
15. Transfer lying to standing pain free	2	0	8	2	0	8	5	0	5	8	0	2	4	0	6
16. Sitting to standing	9	0	3	0	1	9	3	0	7	0	1	9	0	1	9
17. Stand to sit	5	1	4	2	0	8	4	1	5	0	0	10	1	0	9
18. Floor sitting to standing	8	0	2	1	0	9	2	0	8	0	0	10	0	1	9
19. Sit pain free	6	2	2	0	0	10	2	6	2	2	1	7	0	0	10
20. Stand pain free	8	0	2	0	0	10	2	0	8	2	0	8	0	0	10
21. Trunk movement pain free	5	0	5	0	0	10	5	0	5	2	0	8	0	0	10
22. Standing to squatting	9	0	1	2	0	8	0	0	10	1	0	9	1	0	9
23. Squatting into standing	5	0	5	2	0	8	5	0	5	1	0	9	1	0	9
24. Walk a distance outdoors	1	1	8	2	1	7	8	0	2	7	0	3	3	0	7
25. Walking without pain in the lower back	7	0	3	1	0	9	0	1	9	0	0	10	0	0	10
26. Walk independently (not hierarchial)	8	2	0	0	1	9	0	3	7	0	3	7	0	1	9
27. Walk independently with normal gait	5	1	4	1	1	8	4	1	5	2	1	7	0	1	9
28. Functional walking	7	0	3	1	0	9	3	0	7	1	0	9	0	0	10
29. Run in one direction on even ground without pain or limp or leg tiring	5	0	5	1	1	8	5	1	4	1	1	8	1	1	8
30. Run on uneven ground, change direction and pace with no problems afterwards	6	0	4	1	0	9	4	0	6	0	1	9	0	1	9
31. Jog pain free	1	2	7	1	0	9	7	0	3	2	0	8	3	0	7
32. Climb stairs pain free	5	0	5	2	0	8	5	0	5	1	0	9	1	0	9
33. Ascends stairs	6	0	4	0	0	10	4	0	6	0	0	10	0	0	10
34. Use stairs pain free	6	0	4	0	0	10	4	0	6	0	0	10	0	0	10
35. Descend stairs	6	0	4	1	0	9	4	0	6	1	0	9	1	0	9
36. Lift weight	4	1	5	3	0	7	5	0	5	2	0	8	2	0	8

** These questions are extracted from the workbook in Appendix L.*
Q: Question / Y: yes / N: No / D: Don't know

The expert panel suggested that the first indicator in the TELER LBP questionnaire does not include all activities that are affected by LBP and important to Jordanian individuals. The NGT participants acknowledged the presence of other indicators in the same questionnaire, such as items 7, 14, 26 and 28, which cover some of these activities. They recommended replacing these indicators with one generic indicator. In response to the expert panel comments, a TELER quiz-style questionnaire was developed (Table 11.5). The LBP quiz-style questionnaire is considered important for three reasons. Firstly, it is designed to be filled by individuals with LBP in the first session while they are waiting to see the physiotherapist. This might enhance the partnership between the patient and their physiotherapist by ensuring the active participation of both parties in the measurement process. Secondly, the quiz-style questionnaire will form a point of control where the physiotherapist will measure only desired outcomes that are important to the patient. This is important to reduce the number of items without losing precision. Thirdly, the last question in the quiz-style questionnaire is important as a last resort to avoid any unintentional omission of activities that are important to individuals with LBP but are not included in the list above. This question is also important to ensure that the list of activities generated from the qualitative study is comprehensive.

The experts identified a few indicators that were not related to the domain of physical functioning [Appendix N]. For example, the panel suggested the exclusion of item 6 because it represents an impairment indicator, not a physical functioning indicator. Items 3, 4 and 5 were also excluded from the TELER LBP questionnaire because they included activities that are beyond the scope of physiotherapy in Jordan. The participants also indicated that some of the codes in these indicators cannot be falsified and the activities in items 3 and 4 can be performed in at least two different positions. This violated one assumption of the TELER method which mandates that the language used in each TELER code descriptor must provide a singular meaning.

11.4 Summary

In summary, 12 indicators were excluded from the first draft of the TELER LBP questionnaire and five new indicators were added to the pre-testing draft (Appendix O). The group of experts reviewed all indicators in the pre-testing draft, verified their adherence to the TELER method assumptions and accepted the pre-testing draft for clinical testing. This stage ensured the face and content validity of the pre-testing draft of

the TELER LBP questionnaire. It is important to note at this stage that the quiz-style questionnaire and five indicators in the pre-testing draft are not located in the TELER online library. These new indicators are as follow: G2, H1, H2, L2 and L3. The next chapter describes the methods used in the clinical testing phase.

Table 11.5: Quiz-style LBP questionnaire

Do you have any problem when performing the following activities **due to your pain in the lower back?** Please place a mark (e.g. X) next to these affected activities.	**No**	**Yes**	**Irrelevant to me**	**For physiotherapist use**
1. Sleeping continuously				A1
2. Bed mobility				B1
3. Getting up from lying to sit on the edge of bed				B2
4. Getting up from lying to sit on bed (long sitting)				B3
5. Getting out of bed without help				C1
6. Standing straight up from sitting				D1
7. Sitting from standing				D2
8. Standing straight up from sitting on the floor				D3
9. Sitting for a long period of time				E1
10. Standing straight up for a long period of time				F1
11. Bending the trunk forward from standing				G1
12. Raising the trunk upwards to the upright position from bending forward				G2
13. Squatting from standing straight up and maintaining squatting				H1
14. Standing straight up from squatting and maintaining standing				H2
15. Walking in general				I1
16. Walking inside house				I2
17. Walking outside house				I3
18. Walking without help				I4
19. Jogging				J1
20. Running in one direction on even ground				J2
21. Using the stairs in general				K1
22. Ascending of one step				K2
23. Ascending the whole staircase				K3
24. Descending of one step				K4
25. Descending the whole staircase				K5
26. Lifting an object upwards				L1
27. Carrying an object and walking				L2
28. Lowering a carried object on the ground from standing				L3
29. Do you have an activity other than those listed above which is affected by low back pain?				M1

Phase 3: Clinical testing

Chapter 12: Determination of the usefulness of TELER LBP indicators: Piloting the TELER LBP Questionnaire

Chapter 13: Overall discussion

Overview of phase 3: Clinical testing

The aim of the third phase of this thesis is to examine the clinical utility and measurement properties of the TELER LBP questionnaire in the evaluation of functional performance outcomes following musculoskeletal rehabilitation in individuals with LBP. The evaluation process of the new outcome measure adheres to the theoretical specifications of the theory of measurement [Chapter 5] and the standards of measurement in a clinical context [Chapter 6] derived during the phase of conceptualisation. The TELER LBP questionnaire was developed according to the following principles:

- The TELER LBP questionnaire is a patient-reported outcome measure.
- The TELER LBP questionnaire is a measurement tool of individualised outcomes.
- The TELER LBP questionnaire measures the construct *functional performance*.
- The TELER LBP questionnaire was designed to be used in a clinical context to evaluate the outcomes of complex interventions [musculoskeletal rehabilitation]; however, because this measurement tool fulfils the requirements of measurement theory, it can be used in a research setting using an appropriate research design.
- The title of each indicator in the TELER LBP questionnaire defines a treatment goal.
- Each code in the TELER LBP questionnaire represents a clinically significant outcome.
- The codes in any TELER LBP functional indicator are arranged to represent a hierarchical stepwise regain of function.
- The codes in any TELER LBP component indicator are used for managerial purposes to identify problems and if necessary to direct towards other functional indicators.
- The TELER LBP questionnaire traces changes [improvement or deteriorations] and a lack of change in *functional performance*.

These principles have an implication on the methods used to evaluate the clinical utility and measurement properties of the TELER LBP questionnaire in a clinical setting. The following chapter describes these methods in detail.

Chapter 12: Determination of the usefulness of TELER LBP indicators – Piloting the TELER LBP Questionnaire

Key points in Chapter 12:

- The TELER LBP questionnaire is a valid, reliable and responsive measurement tool that provides informative information to a person with LBP, a clinician, researchers, managers and commissioners.

- Jordanian physiotherapists indicated that the TELER LBP indicators informed their clinical decision more than the current outcome measures that they used in their clinics.

- This study showed that the quality of outcomes was good and the majority of LBP patients improved. It is unclear whether or not patients improved because of physiotherapy interventions; however, no patient experienced exacerbation of symptoms while attending physiotherapy sessions. Therefore, it is logical to assume that physiotherapy interventions somehow helped individuals with LBP to achieve their goals.

12.1 Introduction

This section explains the methods used to pilot the TELER LBP questionnaire in Jordanian physiotherapy clinics. During the process of formulating the questionnaire's components, an expert committee systematically examined the TELER LBP indicators to ensure that each statement in the questionnaire was valid [Chapter 11]. The expert committee agreed that the items in the TELER LBP questionnaire represented the different aspects of the construct 'functional performance' which were identified in a qualitative study as important to Jordanian individuals with LBP [Chapter 9]. The previous stage in this research programme [Chapter 11] was important in order to establish the face and content validity of the pre-testing version of the questionnaire. However, a pilot phase was necessary to test the remaining measurement properties described in Chapter 6 in this thesis and clinical utility. The following subsections describe the statistical tests used to analyse construct validity, internal consistency, inter-rater reliability, sensitivity, and floor and ceiling effects. The following subsections also describe the methods used to analyse the TELER indices at the level of the individuals as well as the level of the group.

12.2 Methods

12.2.1 Study design

A prospective multisite cohort study design was conducted in the third phase of this research programme. The study was conducted between the 1st of February 2014 and the 1st of June 2014. Figure 12.1 describes the different stages and methods used in this study.

12.2.2 Validity: Face, content and construct validity

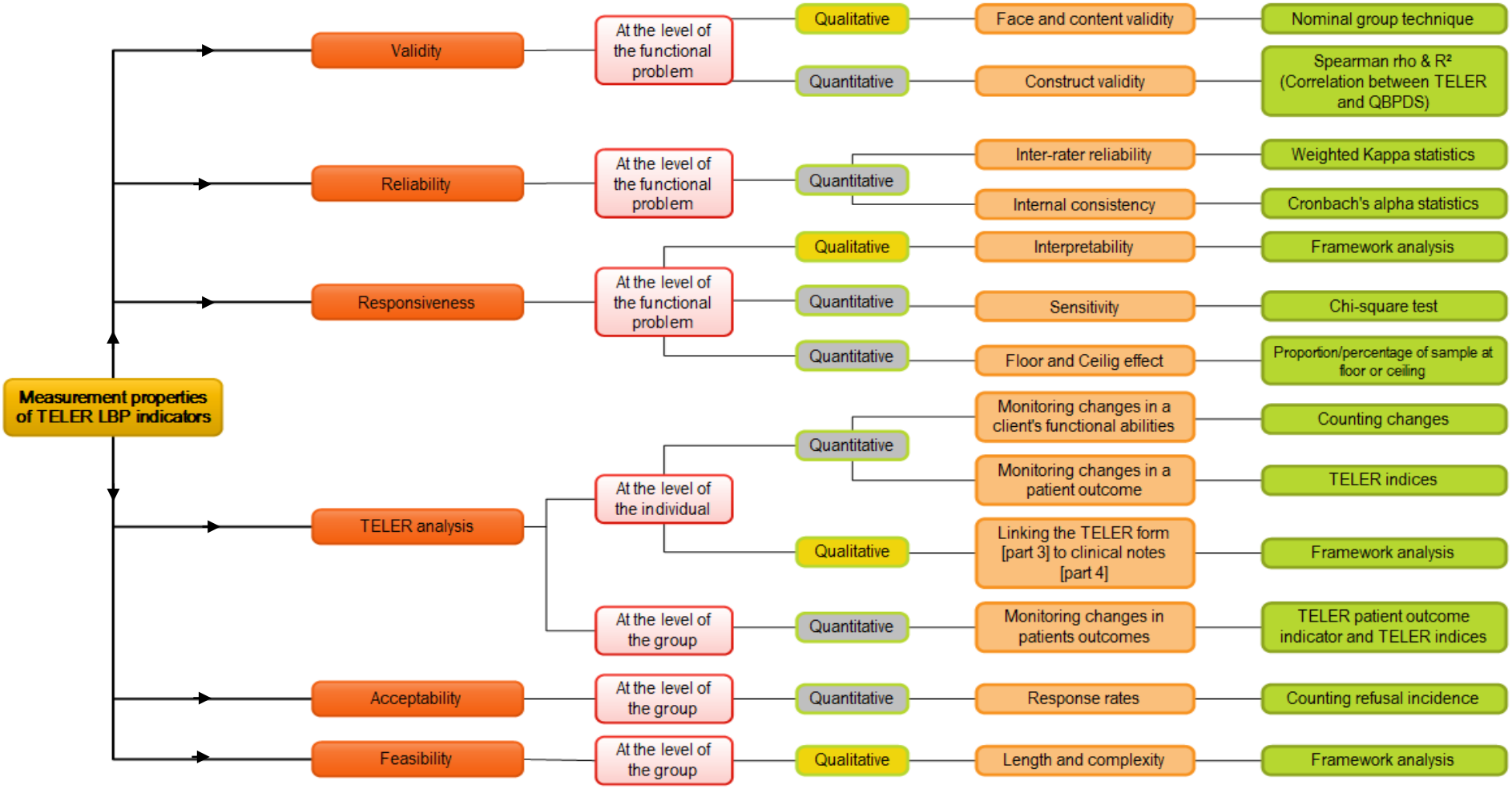
12.2.2.1 Face and content validity

Validity refers to the extent to which a measurement tool measures the phenomenon it is assumed to measure and it is not a fixed property as it is purpose and setting-specific (295). There are four types of validity: criterion, face, content and construct validity. Criterion validity is assessed by comparing the results of one outcome measure with an established (*benchmark*) one that examines the same phenomenon (444). Chapter 7 in this thesis indicated a lack of a so-called "*gold standard outcome measure*" in the LBP field; therefore, criterion validity was not assessed in this study. Face, content and construct types of validity were assessed.

Content validity reflects a judgement on whether or not the items of a scale are sensible and comprehensively cover the domain of interest (91). Face validity simply refers to whether, on the face of the scale's items, the instrument appears to be examining the desired qualities. A NGT was carried out in the previous phase to examine the face and content validity of the TELER LBP indicators. Physiotherapists who participated in these meetings reviewed each indicator separately and voted to be included or excluded from the clinical testing phase (300).

Face and content validity were reviewed qualitatively in the previous phase in this research programme [Chapter 11] because they were dependent on the judgment of the experts whether or not the TELER LBP questionnaire was appropriate for the intended purpose. This form of validation is known as 'validity by assumption', which simply means that an instrument is considered suitable to measure a particular attribute because an expert said it is (445).

Figure 12.1: An outline of the different levels and methods used in the analysis of the TELER LBP questionnaire



12.2.2.2: Construct validity

Construct validity refers to the extent to which an instrument measures the phenomenon that it is designed to measure (91). There are two common forms of construct validity: convergent validity and divergent validity. Statistical tests for convergent and divergent validities involve calculating all of the pairwise correlation coefficients between scores obtained by two scales. A cross-sectional design was used in this study to test convergent construct validity. This type of validity assesses the extent to which a measure result [TELER LBP Questionnaire] agrees with another measurement tool that is designed to measure the same construct (446). In the case of the absence of a 'gold standard outcome measure', it is acceptable to assess construct validity with scales that closely measure either the same outcome (convergent validity) or other outcomes, such as pain (divergent validity). For the purpose of assessing convergent validity in this study, the total score generated by the TELER LBP questionnaire was paired with the total score of the Quebec Back Pain Disability Scale (QBPDS). The QBPDS was selected because it is a self-report Likert scale that measures functional status in individuals with LBP with reference to 'today' on a 20-item scale with six response categories each. The items in the QBPDS were generated from a qualitative study similar to the study conducted in this thesis. Furthermore, even though the scaling methods used in each measure were different, there were six response choices in each of these questionnaires. The author of this thesis took into account the different polarities in each response system [Code 0 in the TELER LBP questionnaire represents the worst-case scenario and a total score of 100 in the QBPDS represents the worst-case scenario]. In order to test the construct validity of the TELER LBP questionnaire, the QBPDS was cross-culturally adapted from its original language into the Arabic language. The author of this thesis described the methods used in the cross-cultural adaptation process and the results in a separate study (96).

The probability distribution of the QBPDS and the TELER LBP questionnaire was calculated in order to permit direct comparison between scores. Table 12.1 shows the probability distribution of the QBPDS and how the scores were converted to a TELER patient outcome indicator. It is important to note at this stage that each participant selected a different number of items from the TELER LBP questionnaire. Therefore, Table 12.2 shows the different calculations of the TELER patient outcome indicator of the TELER LBP questionnaire.

Table 12.1: Probability distribution for the Quebec Back Pain Disability Scale

Total score	Total number of response profiles	Probability (Total score)	Cumulative Probability (Total score)	TELER indicator code
0	1	0.00000000	0.00000000	
1	20	0.00000000	0.00000000	
2	210	0.00000000	0.00000000	
3	1,540	0.00000000	0.00000000	
4 to 8	3,324,394	0.00000000	0.00000000	
9 to 13	571,929,735	0.00000016	0.00000016	
14 to 18	29,458,359,810	0.00000806	0.00000821	5
19 to 23	673,488,403,411	0.00018421	0.00019242	
24 to 28	7,392,268,461,208	0.00202187	0.00221429	
29 to 33	48,336,595,257,548	0.01322060	0.01543489	
34	20,603,519,692,320	0.00563529	0.02107018	
35	26,591,929,631,212	0.00727319	0.02834337	
36 to 41	330,130,346,526,476	0.09029432	0.11863769	
42	91,194,381,588,680	0.02494268	0.14358036	4
43	111,767,706,801,150	0.03056971	0.17415008	
44 to 49	1,087,781,537,506,860	0.29752035	0.47167043	
50	207,154,825,093,824	0.05665915		3
51 to 56	1,087,781,537,506,860	0.29752035	0.47167043	
57	111,767,706,801,150	0.03056971	0.17415008	
58	91,194,381,588,680	0.02494268	0.14358036	2
59 to 64	330,130,346,526,476	0.09029432	0.11863769	
65	26,591,929,631,212	0.00727319	0.02834337	
66	20,603,519,692,320	0.00563529	0.02107018	
67 to 71	48,336,595,257,548	0.01322060	0.01543489	
72 to 76	7,392,268,461,208	0.00202187	0.00221429	
77 to 81	673,488,403,411	0.00018421	0.00019242	
82 to 86	29,458,359,810	0.00000806	0.00000821	
87 to 91	571,929,735	0.00000016	0.00000016	1
92 to 96	3,324,394	0.00000000	0.00000000	
97	1,540	0.00000000	0.00000000	
98	210	0.00000000	0.00000000	
99	20	0.00000000	0.00000000	
100	1	0.00000000	0.00000000	
Total	3,656,158,440,062,980	1.00000000		

- *Mr Le Roux the author of the TELER method carried out the calculations in this table.*
- *The cut-off points in this table were based on the first and second standard deviations from the mean.*

Table 12.2: Calculating the TELER patient outcome indicator of the TELER LBP questionnaire

	Number of TELER indicators in each TELER LBP questionnaire									
Patient Outcome Indicator Code	2 Indicators	3 Indicators	4 Indicators	5 Indicators	6 Indicators	7 Indicators	8 Indicators	9 Indicators	10 Indicators	11 Indicators
1	0	0 or 1	0 to 3	0 to 4	0 to 6	0 to 8	0 to 10	0 to 12	0 to 14	0 to 16
2	1 or 2	2, 3 or 4	4, 5 or 6	5 to 8	7 to 10	9 to 12	11 to 15	13 to 17	15 to 19	17 to 21
3	3 to 7	5 to 10	7 to 13	9 to 16	11 to 19	13 to 22	16 to 24	18 to 27	20 to 30	22 to 33
4	8 or 9	11, 12 or 13	14, 15 or 16	17 to 20	20 to 23	23 to26	25 to 29	28 to 32	31 to 35	34 to 38
5	10	14 or 15	17 to 20	21 to 25	24 to 30	27 to 35	30 to 40	33 to 45	36 to 50	39 to 55
Patient Outcome Indicator Code										
	12 Indicators	13 Indicators	14 Indicators	15 Indicators	16 Indicators	17 Indicators	18 Indicators	19 Indicators	20 Indicators	
1	0 to 18	0 to 20	0 to 22	0 to 24	0 to 26	0 to 28	0 to 30	0 to 32	0 to 35	
2	19 to 24	21 to 26	23 to 28	25 to 30	27 to 33	29 to 35	31 to 37	33 to 39	36 to 43	
3	25 to 34	27 to 38	29 to 41	31 to 44	34 to 46	36 to 49	38 to 52	40 to 55	44 to 56	
4	35 to 41	39 to 44	42 to 47	45 to 50	47 to 53	50 to 56	53 to 59	56 to 62	57 to 64	
5	41 to 60	45 to 65	48 to 70	51 to 75	54 to 80	57 to 85	60 to 90	63 to 95	65 to 100	

- *Mr Le Roux the author of the TELER method carried out the calculations in this table.*
- *The area shaded in grey denotes the total score.*

The correlation between the TELER LBP questionnaire and the QBPDS was assessed using Spearman's correlation (r_s). Equation 12.1 shows the formula used in calculating Spearman rho. Spearman rho is a nonparametric measure of statistical dependence between two variables; however, this test does not show the percentage of variability in observations explained by the dependent variables. To put it in simple words, it concerns how dependent variables [observations] in the QBPDS predict outcomes [functional performance] in individuals with LBP. In order to examine the relationships between the dependent variable and predicted outcomes, R^2 (coefficient of determination) was used (447). Equation 12.2 shows the formula used to calculate R^2. A relationship was regarded as unacceptable if $R^2 < 50$, regarded as good if R^2 was 51%–65%, regarded as moderately good if R^2 = 66%–80% and regarded as very good if $R^2 > 81\%$. SPSS® 22 software was used to calculate Spearman rho and Excel® 2013 in the calculation of R^2.

Equation 12.1: Spearman rho

$$r_s = 1 - \frac{6\sum d_i^2}{\mathrm{n}(n^2 - 1)}$$

where (n) denotes number of pairs and (di) denotes the difference between ranks (295).

Equation 12.2: Coefficient of determination

$$R^2 = (\left(\frac{1}{N}\right) \cdot \frac{\sum[(x_i - \bar{x}) \cdot (y_i - \hat{y})]}{(\sigma\mathrm{x} \cdot \sigma\mathrm{y})})^2$$

where N is the number of observations used to fit the model, Σ is the summation symbol, xi is the x value for observation i, $\bar{x}$ is the mean x value, yi is the y value for observation i, $\hat{y}$ is the mean y value, σx is the standard deviation of x, and σ y is the standard deviation of y.

12.2.3 Reliability: Inter-rater reliability testing

Dunn ((448), p. 59) defines reliability as "*the consistency of scores obtained under the theoretical concept of repeated testing of the same individual on the same test under identical conditions*". Thus, reliability generally refers to the degree of stability of a particular measure's score over time or across different examiners (263). Inter-rater reliability testing was used in this study to examine the agreement between two observers who were measuring functional performance using the TELER LBP indicators. Intra-rater reliability testing was not tested in this research due to the unpredictable and fluctuating nature of pain and function over time, which makes it near impossible to obtain similar results from repeated measurements over a long interval [Chapter 4].

A reliable measure *ensures* objectivity by providing a measurement that is not influenced by the experience, emotions or personal opinions of the assessor (263,300). A concurrent design was used to assess inter-rater reliability of the TELER LBP questionnaire. Two physiotherapists repeated the measurement on the same patient using the same TELER indicators. The level of agreement between the two observers was determined using weighted kappa (K_W) statistics (449). Weighted kappa was selected because it assesses the agreement between two observers using a predefined table of weights — the higher the weight, the higher the agreement. Equation 12.3 shows the formula used in calculating weighted kappa values. There is no consensus in the literature regarding how to interpret the values of the K_W; however, this research programme supports the idea of using probabilities in the interpretation of the values of statistical tests. This is because it takes into consideration the possibility of reaching a wrong conclusion by chance, usually this error in interpretation should not exceed 5%. The probability distribution in Table 12.1 was used in dividing the intervals of K_W values as follows: an agreement was regarded as very poor if $K_W < 20$, regarded as moderately poor if K_W = 21%–35%, regarded as poor if K_W = 36%–50% regarded as good if K_W = 51%–65%, regarded as moderately good if K_W = 66%–80% and regarded as very good if $K_W > 81\%$. This classification was also used in the interpretations of Chronbach's alpha values below. Epidat® 3.1 software was used for the analysis.

Equation 12.3: Weighted kappa

$$K_W = 1 - \frac{\sum wfo}{\sum wfc}$$

where ($\sum \boldsymbol{wfo}$) is the total weighted observed frequencies and ($\sum \boldsymbol{wfc}$) is the total weighted chance frequencies (295).

12.2.4 Reliability: Internal consistency testing

Internal consistency demonstrates the extent to which items measure the various aspects of the same characteristic and nothing else (295). The most common approach to examine homogeneity includes looking at the correlation between all items in a measurement tool. The statistic used to test internal consistency is Cronbach's coefficient alpha (450). Equation 12.4 shows the formula used in calculating Cronbach's alpha (α). A homogeneity level was regarded very poor if (α < 20), regarded moderately poor if (α = 21% – 35%), regarded poor (α = 36% – 50%) regarded good if (α 51%-65%), regarded

moderately good if (α = 66% – 80%) and regarded very good if (α > 81%). Epidat 3.1 software was used for the analysis.

Equation 12.4: Cronbach's coefficient alpha

$$\alpha = \frac{\mathrm{K}}{\mathrm{K}-1}\ (1 - \frac{\sum_{i=1}^{K} \sigma_{Y_i}^2}{\sigma_X^2})$$

where K is number of component, $X=Y1+Y2+\ldots+Y_K$, σ_X^2 is the variance of the observed total test scores and $\sigma_{Y_i}^2$ is the variance of component i for the current sample of persons .

12.2.5 Responsiveness: Interpretability and sensitivity

There are two important characteristics when assessing responsiveness of any outcome measure: sensitivity and interpretability [Chapter 6]. In order to ensure both of these characteristics in the TELER LBP questionnaire, the codes in the TELER LBP indicators were developed specifically to resemble, as closely as possible, the most important phases in the patterns of functional recovery of the activities identified in the qualitative study [Chapter 9]. The TELER indicators were also designed to correspond to clinically significant changes in the performance of physical activities that are experienced by the patients and observed by the physiotherapists.

Any changes in a patient's physical abilities might be attributed to physiotherapy interventions, natural progress of the condition or other unknown factors. In order to attribute changes in the patient's physical abilities to the intervention, a different study design is needed.

The decision that a clinically significant change has occurred and been captured by a measurement tool is based on two criteria: clinical knowledge and observation (451). Therefore, the evaluation of responsiveness in this study was based on the assumption that a physiotherapist has the necessary skills to notice a clinically significant change when it has occurred and document it. It is important to note that the codes in the TELER LBP questionnaire were defined specifically to be mutually exclusive and exhaustive. For the purpose of assessing interpretability, a qualitative method was used in this study to explore physiotherapists' perspective after using the TELER LBP questionnaire. Participants were asked whether or not they found the scores of the questionnaire to be easy to interpret and informed their clinical decision. Semi-structured in-depth interviews and framework analysis methods were used in this qualitative study. The same criteria

used in Chapter 9 to establish trustworthiness were followed in this small qualitative study. The interview topic guideline is presented in Box 12.1. All participants were asked the same questions.

Box 12.1: Interview topic guideline

Good morning/afternoon Mr/Mrs … Thank you very much for taking part in this study. My name is Thamer Altaim and I am a research student at the University of Sheffield in the United Kingdom. You are invited to take part in this study because you have used the TELER LBP questionnaire in the measurement of functional performance in individuals with LBP. Please note that this interview will be audio-recorded. This interview might take up to 10 minutes of your time. Any information or details discussed within this interview will be kept secure and confidential. Any topics discussed will not be shared with anyone except for the supervisory team in the United Kingdom for study purposes. All data will be destroyed five years following the completion of this study.

- Can you please start off by telling me, just briefly, about your experience of using the TELER LBP questionnaire in the clinic?
- Do you think that the TELER LBP questionnaire helped you to take informed decisions? Why?
- Do you think that the information generated by the TELER LBP indicators is easy to interpret?
- Do you recommend using the TELER LBP questionnaire in your clinic? Why?
- Can you tell me more about the time required to fill in the questionnaire? Initial assessment session? Follow-up sessions?

Is there anything else about your experience of using the questionnaire which you would like to talk to me about before we finish up?
Thank you very much for your time. Have a nice day.

For the purpose of assessing the second criterion, sensitivity, the differences in the distribution between change and no change recorded in the TELER form were compared against changes and no changes recorded in the QBPDS.

- The null hypothesis: there is no statistical difference between the 'distribution of changes and no change' recorded on the TELER LBP questionnaire and the 'distribution of change and no change' recorded on QBPDS.
- The alternative hypothesis: there is a statistical difference between the 'distribution of changes and no change' recorded on the TELER LBP questionnaire and the 'distribution of change and no change' recorded on QBPDS.
- Level of confidence: 95%, p-value: 0.05.

The distributions were tested using Chi-square statistics. Equation 12.5 shows the formula used in the Chi-square test. It is important to note that each code in a TELER indicator represents a minimal clinically significant change, where 19 points were required in the QBPDS to consider it to be one clinically significant change (452).

Equation 12.5: Chi-square

$$X^2 = \frac{\sum(O-E)^2}{E}$$

where (O) represents the observed frequency and (E) represents the expected frequency.

The sensitivity and the specificity of the TELER LBP indicators were further tested in this thesis using the Receiver Operator Characteristics (ROC) method. This method was applied to each TELER indicator separately because each patient selected a different range of indicators. The Area Under the Curve (AUC) was interpreted as the probability of correctly discriminating between an 'improved' and 'clinically stable' patient outcome based on the changes in the TELER LBP indicators. The data collected from the inter-rater reliability stage were used as a point of verification where two physiotherapists confirm whether or not the patient has improved. An AUC value of <0.5 is considered unacceptable, a value of between 0.5 and 0.60 is considered poor and a value of between 0.61 and 0.7 is considered acceptable. Good is between 0.71 and 0.8, very good between 0.81 and 0.9, excellent between 0.91 and 0.99 and 1 is regarded as perfect. SPSS® 22 software was used for the analysis.

12.2.6 Responsiveness: Floor and ceiling effects

A cross-sectional design was used in this study to assess the floor and ceiling effects in the TELER LBP questionnaire. Each TELER LBP indicator was assessed to detect whether or not it precluded the reporting of the most favourable or worst physical ability. A floor effect was considered if more than 15% of the participants responded at the worst end of the response scale. Similarly, a ceiling effect was considered if more than 15% of participants responded at the optimal end of the scale (453).

12.2.7 TELER analysis at the level of the individual: Monitoring changes in a client's physical abilities

Two types of analysis were performed at the level of the individual in this study: quantitative and qualitative. The quantitative analysis was further divided into two parts; the first part consisted of counting clinically significant improvement between initial appointments until the discharge session to monitor changes in a client's physical abilities. This analysis was important to help physiotherapists to determine whether or not to continue the current physiotherapy programme or change some of the interventions to promote improvements in patients' physical abilities.

12.2.8 TELER analysis at the level of the individual: Monitoring the patient's outcome

The second part of the quantitative analysis at the level of the individual provided descriptions of the patient's outcome in terms of four TELER indices numbers: deficit index, improvement index, variability index and effectiveness index (383). Excel® 2013 software was used to calculate the TELER indices. Table 12.3 shows the definitions and meaning of values of each TELER index used in this study.

The formula for these indices is only available to the registered TELER users (439). The hypothesis in this part of this study was that 'multimodal physiotherapy treatment' should help individuals with LBP to restore their lost 'functional abilities' and help individuals with LBP to achieve their goals of treatment (300). Therefore, the outcomes of physiotherapy received by a patient were based on the analysis of the data of two TELER indices: improvement index and variability index.

Three categories were used to describe patient outcomes: poor, satisfactory and good. The cut-off points for each category (poor, satisfactory and good) of patient outcomes were based on the classification provided by LongHand Data Limited (383) as follows:

Improvement index

- An improvement index of a value from 0 to 33 is defined as low improvement.
- An improvement index of a value from 34 to 67 is defined as moderate improvement.
- An improvement index of a value from 68 to 100 is defined as high improvement.

Variability index

- A variability index of a value from 0 to 25 is defined as stable condition.
- A variability index of a value from 25 to 50 is defined as marginally stable condition.
- A variability index of a value from 51 to 100 is defined as unstable condition.

Table 12.3: Definitions and values of TELER indices

TELER index	Definition	Range	Meaning
Deficit index (DI) §	"*is a patient specific measure for tracing change since admission in physiological, psychological or other clinically significant function presented by a patient, and does not permit valid comparisons of patients. The measure traces change between successive appointments in functional ability*".	Range from 0 to 100.	• 0 denotes 'no loss of function'. • 100 denotes 'complete loss of function'.
Improvement index (II) §	"*is a patient specific measure for tracing recovery of lost function between successive appointments, and does not permit valid comparisons of patients*".	Range from 0 to 100.	• 0 denotes 'no recovery'. • 100 denotes 'full recovery'.
Variability index (VI) §	"*is a patient specific measure for tracing changes in a patient's condition while the patient is under treatment and does not permit valid comparisons of patients*".	Range from 0 to 100.	• 0 denotes 'no variability' or 'complete control of the recovery process and minimum cost of treatment' • 100 denotes 'maximum variability' or 'no control of the recovery process and maximum cost of treatment'.
Effectiveness index (EI) §	"*is a patient specific measure for tracing effectiveness in avoiding deterioration over a period of treatment*".	Range from 0 to 100.	• 0 denotes 'no effectiveness in avoiding deterioration' • 100 denotes 'completely effective in avoiding deterioration'. • In many contexts, 0 denotes 'no control of the recovery process and maximum cost of treatment' and 100 denotes 'completely in control of the recovery process and minimum cost of treatment'.

§: A patient specific measure and it does not permit valid comparisons of patients. The measure is based on the assumptions that a clinically significant change occurs over a clinically significant period, and the intervals between successive appointments are clinically significant periods or parts of such periods.
These definitions were sighted in Le Roux (383)

The improvement and variability indices were selected because they were related to each other. For example, when the variability index is less than 50% it shows that improvements exceeded deteriorations and that the patient's condition improved (383). The smaller the variability index, the more complete the improvement. Le Roux (383), p. 3, stated: "*A variability index of 0 shows all changes were improvements and vice versa. When the Variability Index is 50 it shows improvements balanced deteriorations and loss of function since admission was recovered*". A patient outcome was described as good, satisfactory or good according to the definitions of the improvement and variability indices.

Good patient outcome

1. Either high or moderate improvement.
   - The value of the improvement index is 68-100.
   - The value of the improvement index is 34-67.
2. The patient's clinical condition was stable.
   - The value of the variability index is 0-25.

Satisfactory patient outcome

1. Either moderate or low improvement.
   - The value of the effective index is 34-67.
   - The value of the effectiveness index is 0-33.
2. The patient's clinical condition was marginally unstable.
   - The value of the variability index is 25-50.

Poor patient outcome

1. Either moderate or low improvement.
   - The value of the improvement index is 34-67.
   - The value of the improvement index is 0-33.
2. The patient's clinical condition was unstable.
   - The value of the variability index is 50-100.

12.2.9 TELER analysis at the level of the individual: Linking the TELER form [part 3] to clinical notes [part 4]

A TELER clinical note section [Part 4 in Appendix Q] was added to the TELER questionnaire in order to encourage physiotherapists, who participated in this research, to avoid focusing on managing the LBP symptoms without taking into consideration the wider view of the LBP patient and their concerns. The clinical notes in part four in the questionnaire were designed to obtain as much description of other health conditions that might affect a patient's physical abilities to help make informed decisions. The framework method was used in the analysis of the qualitative data. The analysis only involved the charting of responses across the framework used in the qualitative study in the second phase of this research programme. The framework was used to organise the

data collected from the clinical notes to identify links between these records and changes or the lack of change in the scores of the TELER indicators.

12.2.10 TELER analysis at the level of the group – quantitative analysis at the level of functional problems presented

The collated TELER data were analysed quantitatively at the level of the group using the TELER patient outcome indicator[20] and TELER indices to provide informative evidence about the quality of treatment to the managers. The analysis of the TELER data at the level of the group aimed to provide descriptions of the overall extent of the group functional loss on admission, potential for improvement and the overall extent of the group change on discharge. The analysis was also carried out to test the following hypothesis:

The experimental hypothesis [1]: the number of LBP patients who presented in the initial assessment session with a high level of disability is statistically significant. This is because Chapter 1 in this thesis suggested that individuals with LBP who are severely affected by their problems seek medical attention. Therefore, it is logical to assume that the majority of participants in this study are likely to select lower codes that indicate that they were severely affected by LBP at the initial assessment session.

The null hypothesis [1]: the number of LBP patients who presented early with a high level of disability is not statistically significant. This means that there is no difference at the initial assessment session between patients.

The experimental hypothesis [2]: the number of LBP patients who restored their lost functions at the discharge session is statistically significant. Chapter 1 also suggested that LBP is a self-limiting condition lasting less than three months regardless of treatment; therefore, it is logical to assume that the majority of patients are likely to experience improvements (454) and this will be reflected in the mode of TELER codes.

The null hypothesis [2]: the number of LBP patients who restored their lost functions at the discharge session is not statistically significant. This means that there is no difference at the discharge session between patients who improved and those who are severely disabled.

20 Le Roux (383), p. 4, defined TELER patient indicator as "*a patient specific measure for tracing the number of treatment goals achieved*".

12.2.11 Acceptability

This part of the current study examined whether or not the TELER LBP questionnaire was acceptable to the study participants. Questionnaire acceptability was assessed in terms of the response rate by counting the number of individuals who refused to continue the process of measurement or did not complete some of the indicators in the questionnaire (455). Physiotherapists recorded all refusal cases on a separate sheet and provided a summary of reasons behind why patients decided not to complete the questionnaire.

12.2.12 Feasibility

This part assessed the impact of collecting and processing the information from the TELER LBP questionnaire on staff working in physiotherapy clinics involved in this research. The feasibility was assessed in terms of the time required to administer and process the questionnaire. Physiotherapists were asked to report the time required to complete the questionnaire in the initial assessment session and in follow-up sessions. Semi-structured in-depth interviews and thematic framework analysis methods were used in this study (390). Physiotherapists were encouraged to discuss any concerns that they had around the burden of collecting information using the TELER LBP questionnaire.

12.2.13 Clinical settings

This study took place at three private physiotherapy centres in Amman, Jordan. These were Spine Care Jordan, Islamic Hospital and Physio Medic. These physiotherapy centres were selected because they were specialised centres for managing musculoskeletal spinal problems, including LBP [Appendix R].

12.2.14 Sample characteristics

12.2.14.1 Physiotherapists

A purposive sampling method was used in the recruitment of physiotherapists. Individuals who met the inclusion/exclusion criteria (Table 12.4) were invited to take part in the clinical testing study.

12.2.14.2 Individuals with LBP

Individuals who met the inclusion/exclusion criteria (Table 12.4) were invited to take part in this study by the clinic's admission team. Convenience sampling was adopted in this study because it was flexible, quick and gave access to the majority of LBP patients who were referred to the physiotherapy clinics involved in this study.

Table 12.4: Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Physiotherapists	▪ Practicing musculoskeletal physiotherapists to represent typical practice. ▪ Participants must have at least three years of experience in the management of LBP. This is important to ensure that the participants have an adequate knowledge about LBP and the trajectory of the condition. ▪ Participants must have adequate understanding of the TELER method. A workshop was conducted before the commencement of the clinical testing study. ▪ Willing to participate voluntarily in this research.	▪ Unable to communicate in the Arabic or English languages.
Individuals with LBP	▪ Participants who consider low back pain as their main complaint. ▪ Participants' greater than18 years old, this is important because they will be primarily responsible for their participation in this study and able to consent. ▪ Participants who are referred to physiotherapy by rehabilitation or orthopaedics physicians to represent typical practice in Jordan. ▪ Those who agree to take part in the study voluntarily.	▪ Any participant who is unable to communicate in Arabic. This is important because this questionnaire was developed for individuals with LBP in Jordan. ▪ Any patient who is not clinically or medically stabilised. ▪ Any patient who is unable to provide consent.

12.2.15 Recruitment

Individuals who were complaining about LBP and commencing a musculoskeletal rehabilitation programme in the private physiotherapy clinics involved were invited to take part in this study. Physiotherapists who agreed to take part in this study approached individuals with LBP who met the inclusion/exclusion criteria and asked them whether or not they were interested in taking part in this research. Those who showed interest in taking part in this research were given information sheets and consent forms at the initial assessment session [Appendix S]. Due to the nature of this research, participants were asked to sign the consent form before the beginning of their physiotherapy programme and they were assured that they had the right to withdraw at any time from this study without any negative consequences on their physiotherapy programme. Those who refused to take part in this study in the initial assessment session continued the usual admission protocol implemented in the clinic.

12.2.16 Data collection

A baseline measurement using the TELER LBP questionnaire [Appendix Q] was performed at the beginning of the physiotherapy programme. The measurement of functional status was performed at the beginning of each follow-up session to reflect as many changes as possible in an individual's physical abilities. The purpose of using the TELER LBP questionnaire in this study was to measure changes between consecutive physiotherapy sessions in physical abilities and was based on the assumptions that a clinically significant change occurs over a clinically significant period, and the intervals between consecutive sessions were clinically significant periods or parts of such periods. Patients were assessed using the TELER LBP questionnaire at initial assessment, during follow-up and at the discharge sessions in accordance with the policies followed in these clinics involved. This also included a full range of pathoanatomical, pathophysiological and pain assessments. Few examples of these instruments used in these clinics are presented in Appendix T.

12.2.16.1 Initial assessment session

Individuals with LBP who agreed to take part in this study were given the TELER LBP quiz-style indicator and the translated QBPDS [Appendix Q]. Participants were encouraged to answer all questions and return questionnaires to their physiotherapists before the commencement of their therapy. The TELER quiz-style indicator directed physiotherapists to select only these indicators [Part 2 in Appendix Q] relevant to the patient. The second part of the TELER LBP questionnaire contained a list of indicators that were specifically designed for people with LBP. Physiotherapists used a special TELER form [Part 3 in Appendix Q] to document their observations for each of the selected TELER LBP indicators.

12.2.16.2 Follow-up sessions

Functional performance was measured at the beginning of each follow-up physiotherapy session using the selected TELER LBP indicators and the QBPDS. Patients' desired outcomes were re-evaluated in another physiotherapy session half-way through the programme using the quiz-style indicator to ensure the inclusion of all important goals to each individual patient.

Inter-rater reliability was assessed in one of the follow-up sessions. It was important to include patients with various levels of limitations in functional performance. Two physiotherapists measured functional performance for an individual with LBP using the second and third parts of TELER LBP questionnaire. For the purpose of inter-rater reliability testing, a sequential design was selected where one physiotherapist measured the functional performance of an individual with LBP, followed by to another physiotherapist who performed the measurement of the functional performance using the same indicators. It was important to decrease the chance of any changes in a patient's physical abilities and to reduce the possibility of one of them influencing the judgment of the other observer.

12.2.16.3 Discharge session

Functional performance was measured at the discharge session using the selected TELER LBP indicators and the QBPDS. Physiotherapists were encouraged to document any comment they had in the clinical notes section [Part 4 in Appendix Q].

12.2.17 Ethics

The ethics committee of Al-Bashir Hospital approved the clinical testing study [Appendix U]. The ethics committee of Al-Bashir Hospital is recognised by the University of Sheffield's Research Ethics Committee as having in place sufficiently robust ethics review procedures.

12.3 Results

Eight musculoskeletal physiotherapists and 30 consecutive individuals with LBP who fulfilled the eligibility criteria entered into the study between the 23rd of January and the 15th of May 2014. Table 12.5 describes the characteristics of physiotherapists who participated in this study. Table 12.6 shows the demographic data of the LBP patients who completed the baseline assessment using the TELER LBP questionnaire. The median age was 47.5 and the mode was 30. The sample in this study included a variety of age groups (20–79 years), occupations and social statuses. Indicators were selected by LBP patients according to their relevance and importance to them.

Table 12.5: Physiotherapists

Name	Field	Years of experience	Place of work
LBP-01	Musculoskeletal physiotherapist	23 years	Spine Care Center
LBP-02	Musculoskeletal physiotherapist	5 years	Islamic Hospital
LBP-03*	Musculoskeletal physiotherapist	4 years	Spine Care Center
LBP-04*	Musculoskeletal physiotherapist	4 years	Spine Care Center
LBP-05*	Musculoskeletal physiotherapist	3 years	Spine Care Center
LBP-06*	Musculoskeletal physiotherapist	3 years	Spine Care Center
LBP-07*	Musculoskeletal physiotherapist	4 years	Physio Medic Center
LBP-08	Musculoskeletal physiotherapist	9 years	Kaboushi Center

** Physiotherapists who were interviewed after the completion of the clinical testing study.*

12.3.1 Face validity and content validity

Face validity and content validity of the TELER LBP questionnaire were checked by the NGT. The expert committee systematically reviewed the pre-testing version of the TELER LBP questionnaire and concluded that it was valid.

12.3.2 Construct validity

Construct validity was examined by Spearman rho and R^2 (456). Changes recorded in the TELER LBP questionnaire and on the QBPDS were converted to a TELER patient outcome indicator (POI) (Table 12.7). This was important in order to compensate between the differences in the number of items in both questionnaires. The Spearman rho between the TELER LBP questionnaire and the QBPDS was $r_s = 0.46$ ($p<0.05$). Therefore, the correlation between both questionnaires was considered moderate. However, the coeffcient of determination (R^2) was 23.9%; suggesting the existence of another variable than observations.

It is important to note that the TELER LBP questionnaire was not designed to replicate precisely the QBPDS. Thus, the correlation value and coefficient of determination were not expected to be perfect.

Table 12.6 Individuals with LBP

Participant ID	Age	Occupation	Gender	Social status	Number of indicators	Number of sessions
CTS-01	27	Translator	Female	Single	14	8
CTS-02	75	Housewife	Female	Married	7	7
CTS-03	64	Contractor	Male	Married	14	8
CTS-04	30	Researcher	Male	Married	10	8
CTS-05	50	Lawyer	Male	Married	6	5
CTS-06	49	Businessman	Male	Married	17	9
CTS-07	76	Engineer	Male	Married	19	21
CTS-08	40	Businessman	Male	Married	9	6
CTS-09	63	Professor	Male	Married	6	11
CTS-10	37	Electrician	Male	Married	20	10
CTS-11	79	Retired	Male	Married	7	12
CTS-12	20	Student	Female	Single	17	3
CTS-13	58	Housewife	Female	Married	16	10
CTS-14	42	Driver	Male	Married	12	10
CTS-15	59	Retired	Male	Married	8	10
CTS-16	58	Chef	Male	Married	15	8
CTS-17	39	Senior Lecturer	Male	Single	4	6
CTS-18	30	Mechanics	Male	Married	11	5
CTS-19	43	Missing	Male	Single	13	5
CTS-20	73	Housewife	Female	Widow	15	5
CTS-21	55	Housewife	Female	Married	13	4
CTS-22	46	Housewife	Female	Married	13	6
CTS-23	38	Accountant	Male	Married	20	12
CTS-24	70	Retired	Male	Married	13	11
CTS-25	50	Lawyer	Male	Married	12	10
CTS-26	34	Missing	Male	Married	5	6
CTS-27	38	Painter	Male	Married	12	5
CTS-28	34	Carpenter	Male	Married	13	6
CTS-29	56	Retired	Male	Married	16	9
CTS-30	42	Driver	Male	Married	14	10

Table 12:7: A comparison between changes recorded on the TELER LBP questionnaire and QBPDS

Patient-ID	Total score of TELER in session X	Total score of TELER in session Y	Total score of QBPDS in session X	Total score of QBPDS in session Y	POI of TELER in session X	POI of TELER in session Y	POI of QBPDS in session X	POI of QBPDS in session Y	Net change of TELER	Net change of QBPDS
CTS-01	32	54	55	12	3	5	3	5	2	2
CTS-03	35	51	65	48	3	5	1	3	2	2
CTS-04	30	50	9	8	3	5	5	5	2	0
CTS-06	26	68	83	22	1	5	1	5	4	4
CTS-07	3	78	92	46	1	5	1	3	4	2
CTS-08	13	17	53	37	3	3	3	4	0	1
CTS-10	39	98	57	1	2	5	2	5	3	3
CTS-13	34	42	65	66	3	3	1	1	0	0
CTS-14	14	48	33	13	1	5	5	5	4	0
CTS-15	13	31	67	58	2	5	1	2	3	1
CTS-16	38	56	25	28	3	5	5	5	2	0
CTS-17	7	15	9	1	3	4	5	5	1	0
CTS-18	28	43	48	47	3	5	3	3	2	0
CTS-19	33	65	34	0	3	5	5	5	2	0
CTS-20	33	64	60	34	3	5	2	5	2	3
CTS-21	38	41	62	50	3	4	2	3	1	1
CTS-23	17	70	86	36	1	5	1	4	4	3

- *Sessions X and Y denote physiotherapy sessions. Session X does not denote the initial assessment session and Session Y does not denote the discharge session; however, Session X was conducted before Session Y. Both questionnaires were used in Session X as well as in Session Y.*
- *POI: Patient Outcome Indicator. The POI of the QBPDS was determined using the numbers in Table 12.1. The POI of the TELER LBP questionnaire was determined using the numbers in Table 12.2.*
- *The red boxes denote a disagreement between the results of the two questionnaires, where one of them records a change / lack of change and the other one does not record a similar pattern.*

12.3.3 Inter-rater reliability

Six physiotherapists from the sample of eight physiotherapists available examined a sample of 18 LBP patients from one clinic [Spine Care Centre] using the TELER LBP questionnaire. Each patient was assessed by two physiotherapists within 30 minutes of each other on the same day. It is important to note that each patient in this study selected a different number of TELER LBP indicators. Therefore, the data presented in this subsection represent a range of K_w. Physiotherapists agreed in seven cases ($K_w = 1$). Physiotherapists slightly disagreed in 11 cases ($K_w = 0.94$, Range: 0.4579–1); however, their disagreement was only in the range of one unit of measurement [one TELER code]. Even with this slight disagreement between physiotherapists, the inter-rater reliability of the TELER LBP questionnaire was considered very good. It is important to note that the disagreement was always with the second observer ratings. The second observer was not responsible for delivering physiotherapy to the patient.

12.3.4 Internal consistency

Different correlation matrices of different combinations of TELER LBP indicators revealed a high degree of internal correlations. Cronbach alpha coefficients were all positive and ranged between 0.84 and 0.99, mode = 0.98 and median = 0.96. Therefore, the homogeneity between the TELER indicators was considered very good.

12.3.5 Responsiveness: Interpretability and sensitivity

Five physiotherapists (Table 12.5) were interviewed after the completion of the data collection process. All participants (100%) indicated in the semi-structured interviews that the TELER LBP indicators helped them to make informed decisions during the physiotherapy session without any undue delay. Participants suggested that the scores generated by the TELER LBP indicators were easy to interpret.

LBP-03: "*I believe the items [in the questionnaire] helped us and directed us to understand these problems that are important to the patient. I mean if you are running a physiotherapy programme and you get back to these indicators and check the numbers with the patient, you might notice that two or maybe three of them didn't change or one of them is showing deterioration! This [documentation] system helped us to precisely know where exactly is the problem and think about what we can do to solve the problem. When I compare this with my questions around pain intensity and pain location, this information will not show me what is the impact of the problem! I believe*

these indicators helped us to think more and directed us to focus the therapy on these problems that are important to the patient. This system also helped us to take the decision on whether or not to refer the patient to a specialist".

Chi-square was used in this study to assess the differences in the distribution of clinically significant changes and no change recorded on the TELER LBP questionnaire and QBPDS. Table 12.8 and Table 12.9 show the calculations of the Chi-square for each questionnaire. The results [9.94] suggest that the TELER is statistically significant at the 95% level, and the result [0.52] for QBPDS is not [Tabulated $X^2 = 3.481$, df = 1, p-value = 0.05].

Table 12.8: Distribution of observed and expected values resembling the distribution of changes and no changes on TELER

TELER				
	Observed	**Probability**	**Expected**	**$(O - E)^2 \div E$**
Improvement	15	0.5	8.5	4.97
No improvement	2	0.5	8.5	4.97
Total	17	1.0	17.0	9.94

Table 12.9: Distribution of observed and expected values resembling the distribution of changes and no changes on QBPDS

QBPDS				
	Observed	**Probability**	**Expected**	**$(O - E)^2 \div E$**
Improvement	10	0.5	8.5	0.26
No improvement	7	0.5	8.5	0.26
Total	17	1.0	17.0	0.52

Degree of freedom in both tables = 1, p-value = 0.05, 95% confidence level

Since the calculated X^2 is bigger than the tabulated X^2 [9.94>3.481, respectively], the null hypothesis was rejected and the alternative hypothesis was accepted. This indicated a difference between observed and expected improvement and no improvement recorded in the TELER LBP indicators but not in the QBPDS. This was further confirmed through the ROC curve method (Table 12.10) for each TELER indicator. The AUC ranged between 0.99 and 1 indicating excellent to perfect sensitivity and specificity. It is clear from the results that the TELER LBP indicators are more sensitive to change than the QBPDS.

Table 12.10 Calculation of the Area Under the Curve for each TELER LBP indicator using the Receiver Operator Method

Indicators	Area Under Curve	Interpretation	No problem	Problems present	Std. Error	p-value	Confidence interval
A1	1	Perfect	14	70	0	0	
B1	0.992	Excellent	25	59	0.01	0	0.972-1
B2	1	Perfect	37	76	0	0	1-1
B3	1	Perfect	26	46	0	0	1-1
C1	1	Perfect	11	59	0	0	1-1
D1	1	Perfect	16	67	0	0	1-1
D2	1	Perfect	15	44	0	0	1-1
D3	1	Perfect	16	43	0	0	1-1
E1	1	Perfect	14	97	0	0	1-1
F1	1	Perfect	10	113	0	0	1-1
G1	0.994	Excellent	21	87	0.007	0	0.981-1
G2	1	Perfect	9	72	0	0	1-1
H1	1	Perfect	5	38	0	0	1-1
H2	1	Perfect	2	28	0	0.02	1-1
I1	1	Perfect	10	73	0	0	1-1
I2	1	Perfect	2	61	0	0.017	1-1
I3	0.991	Excellent	9	92	0	0.008	0.975-1
I4	1	Perfect	4	44	0	0.001	1-1
J1	1	Perfect	4	35	0	0.001	1-1
J2	1	Perfect	3	36	0	0.004	1-1
K1	1	Perfect	2	84	0	0.016	1-1
K2	1	Perfect	8	26	0	0	1-1
K3	1	Perfect	2	51	0	0.017	1-1
K4	1	Perfect	2	19	0	0.023	1-1
K5	1	Perfect	3	34	0	0.005	1-1
L1	1	Perfect	9	67	0	0	1-1
L2	1	Perfect	10	58	0	0	1-1
L3	0.99	Excellent	13	52	0.011	0	1-1

12.3.6 Responsiveness: Floor and ceiling effects

Floor and ceiling effects were examined by calculating the number of patients who obtained the lowest or highest possible scores. Table 12.11 shows the scores recorded on the TELER LBP questionnaire at the initial assessment and discharge sessions. There was no floor effect; however, there was a ceiling effect (23.3%). The TELER LBP questionnaire can be used with people who are severely affected by LBP. It is logical to assume that the ceiling effect means that participants restored their lost functional abilities and that they do not require more physiotherapy sessions; therefore, this information might be of great importance when it comes to the decision on discharging the patient.

Table 12.11: TELER LBP questionnaire scores at the initial assessment and discharge sessions

Patient-ID	Initial session	Discharge session	Floor and ceiling effects
CTS-01	30/70	54/70	Non
CTS-02	20/35	32/35	Non
CTS-03	35/70	57/70	Non
CTS-04	30/50	50/50	Highest
CTS-05	17/30	25/30	Non
CTS-06	26/85	68/85	Non
CTS-07	3/90	78/95	Non
CTS-08	13/30	23/30	Non
CTS-09	9/30	29/30	Non
CTS-10	39/100	98/100	Non
CTS-11	6/35	32/35	Non
CTS-12	26/85	26/85	Non
CTS-13	20/80	40/80	Non
CTS-14	14/60	48/60	Non
CTS-15	13/40	31/40	Non
CTS-16	38/75	56/75	Non
CTS-17	5/20	17/20	Non
CTS-18	25/55	43/55	Non
CTS-19	33/65	65/65	Highest
CTS-20	33/75	62/75	Non
CTS-21	38/65	41/65	Non
CTS-22	34/65	59/65	Non
CTS-23	17/100	70/100	Non
CTS-24	31/65	65/65	Highest
CTS-25	35/60	60/60	Highest
CTS-26	11/25	18/25	Non
CTS-27	37/60	60/60	Highest
CTS-28	36/65	65/65	Highest
CTS-29	41/80	80/80	Highest
CTS-30	13/70	62/70	Non

12.3.7 Monitoring changes in a client's physical abilities

The numbers of improvements or deteriorations on all indicators used by patient CTS-07 are presented in Table 12.12. This participant was selected as an example throughout this study because he selected a high number of indicators (n=19) that were used in more than 20 sessions. Data above the dashed line represent neither an improvement nor a deterioration, and data below the dashed line resemble a clinically significant change that was reported by the patient and observed by the therapist. Data below the thick orange line resemble a statistical and clinical significant change in TELER functional indicators. Data below the thick blue lines resemble a statistically and clinically significant change in TELER component indicators. The calculation of statistical significance at the level of the individual was based on calculating the probability of chance occurrence of improvement, deterioration and no change in a TELER functional indicator or component indicator. A statistically significant change has a probability of happening which is very small to be explained by chance (275).

Table 12.12: The significance of the number of improvements or deteriorations recorded on TELER

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2	2					
3	4					
4	3					
5	7	3				

Similar tables of data distribution were developed for each participant [Appendix V]. A summary of Appendix V is presented in Table 12.13. Table 12.13 indicates that the majority of participants experienced both clinically significant changes and statistically significant changes (n=28). The mode of clinically significant changes was 20 (range: 0–75) and of statistically significant changes was 6 (range: 0–15).

Table 12.13: Summary of clinically significant changes versus statistically significant changes

Patient-ID	Numbers of clinically significant changes	Numbers of statistically significant changes
CTS-01	24	3
CTS-02	12	3
CTS-03	22	5
CTS-04	20	5
CTS-05	8	1
CTS-06	42	7
CTS-07	75	15
CTS-08	10	1
CTS-09	20	5
CTS-10	59	13
CTS-11	26	6
CTS-12	0	0
CTS-13	20	3
CTS-14	34	7
CTS-15	18	2
CTS-16	17	1
CTS-17	12	2
CTS-18	18	3
CTS-19	32	6
CTS-20	29	2
CTS-21	5	0
CTS-22	25	6
CTS-23	53	10
CTS-24	34	6
CTS-25	25	4
CTS-26	7	1
CTS-27	23	2
CTS-28	29	4
CTS-29	39	6
CTS-30	49	13

12.3.8 Monitoring the quality of patient outcomes at the level of the individual

Patient outcome was described in terms of the number of clinically significant improvements at the end of the physiotherapy programme. Table 12.14 shows that from admission until the discharge session, 26 participants have a good-quality outcome, two participants have a satisfactory outcome and two participants have a poor outcome.

Table 12.14: Summary of TELER indices used to determine the quality of physiotherapy services

Measure		Patient ID														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Deficit Index	Start	57	43	50	40	43	69	97	57	70	61	83	69	75	77	68
	End	23	9	19	0	17	20	18	23	3	2	9	69	50	20	23
Improvement Index	End	60	80	63	100	62	71	87	59	95	97	90	0	33	74	67
Variability Index	End	7	0	13	0	0	10	0	19	5	0	0	0	19	17	15
Effectiveness Index	End	93	100	83	100	100	90	100	81	95	100	100	100	81	83	85
Quality of physiotherapy	End	G	G	G	G	G	G	G	G	G	G	G	P	S	G	G

Measure		Patient ID														
		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Deficit Index	Start	49	75	55	49	56	42	48	83	52	42	65	38	45	49	81
	End	25	15	22	0	17	37	9	30	0	0	28	0	0	0	11
Improvement Index	End	49	80	60	100	69	11	81	64	100	100	50	100	100	100	86
Variability Index	End	30	7	5	0	9	0	0	0	0	0	0	0	0	0	2
Effectiveness Index	End	70	93	95	100	91	100	100	100	100	100	100	100	100	100	98
Quality of physiotherapy	End	S	G	G	G	G	P	G	G	G	G	G	G	G	G	G

G: denotes Good Patient Outcomes, S denotes Satisfactory Patient Outcomes, and P denotes Poor Patient Outcomes.

The TELER form of patient CTS-07 [Appendix W] was used here as an example to describe changes in outcomes at the individual level. The form shows that 15 out of the 19 indicators recorded clinically and statistically significant changes in outcomes which are important to this patient between initial assessment and discharge sessions (n=21). This means that there is sufficient statistical evidence to indicate that these observed patterns of changes were not due to chance and it is highly likely due to something else. The TELER form of participant CTS-07 shows that the deficit index on admission was 97%, indicating a high loss of functions due to LBP. The deficit index on discharge was 18%, indicating that the patient restored 79% of these lost functions. The variability index indicates that this participant has a stable pattern of improvements, which, in turn, suggested that the patient outcome was good.

12.3.9 Linking the TELER form to clinical notes

Clinical notes were linked qualitatively to the TELER form to seek explanations for the lack of improvement or full recovery from the patient or the physiotherapist perspectives. Clinical notes contained valuable information that was related to contextual factors and factors related to the impact of LBP on physical abilities. The clinical notes of participant CTS-07 were used here as an example. The TELER form showed that this participant did not achieve a full recovery at the discharge session in nine out of the 19 goals that he identified earlier in the initial assessment session as important to him. The clinical notes indicated that he was complaining, beside LBP, about osteoarthritis in his hips and knee joints, which prevented full improvements in his abilities to stand up from sitting, to bend forward, to stand up from kneeling, and walking (four indicators), climbing the stairs and lifting weights. Clinical records of other participants also indicated that fear of movement, obesity and other health conditions, such as arthritis, prevented a full recovery.

12.3.10 Results of quantitative analysis at the level of functional problems presented

The data recorded on the TELER forms were analysed at the level of the group using the TELER patient outcome indicator and the TELER indices. It is important to note that the TELER indices facilitated the analysis at both the level of the individual and group. Table 12.15 shows the median, the mode and the mean for each TELER index. The mean for the patient outcome indicator shows a change between the initial assessment session and

discharge session. The mean of the Deficit Index shows a moderate to large (42.97%) improvement. This was further confirmed by the Improvement Index, which shows that 72.93% of the deteriorations experienced before the start of the physiotherapy programme were recovered. The Variability Index shows that the pattern of improvement was stable between the initial assessment session and the discharge session. The median and the mood show that the distribution for all variables was symmetrical at the end. The Deficit Index at the end shows that the deficit at the start was recovered. However, Table 12.15 does not show the number of patients who did not change even after the commencement of the physiotherapy programme. Thus, Table 12.16 was developed to show the number of patients who improved, did not change or those who experienced deteriorations. Table 12.17 shows the distribution of the patients on the patient outcome indicator at the start and at the end.

Table 12.15: Outcome per patient by the type of measurement

Measure		Type of measurement		
		Median	Mode	Mean
Patient Outcome Indicator	At start	3	3	2.33
	At end	5	5	4.7
Deficit Index	At start	56.5	49	59.6
	At end	17	0	16.63
Improvement Index	At end	77	100	72.93
Variability Index	At end	0	0	5.27
Effectiveness Index	At end	100	100	94.23

Table 12.16: Number of patients by the type of change

Measure	Outcome			
	Improved	No change	Deteriorated	Total
Deficit Index	29 (96.67%)	1 (3.33%)	0 (0%)	30 (100%)

Table 12.17: Number of patients by the Patient Outcome Indicator code at the start and end

Indicator code	Number		Percent	
	At start	At end	At start	At end
1	9	1	30%	3.3%
2	4	0	13.3%	0%
3	15	1	50%	3.3%
4	2	3	6.7%	10%
5	0	25	0%	83.4%
Total	30	30	100.0	100.0

The distribution of codes in Table 12.17 shows a concentration on code 3 at the start of the physiotherapy programme, which might indicate that the majority of participants were not suffering from a severe disability. However, the results [$X^2 = 119.65$] of the chi-square test in Table 12.18 suggest that the number of LBP patients who presented with a high level of disability in the initial assessment session is statistically significant [Tabulated $X^2 = 9.488$, df = 4, p-value = 0.05]. Therefore, the first null hypothesis is rejected and the first experimental hypothesis is accepted.

Table 12.17 shows that the majority of participants (n=25) achieved code 5 at the discharge session. The result [1008.12] of the chi-square test in Table 12.18 suggests that the number of LBP patients who restored their lost functions at the discharge session is statistically significant [Tabulated $X^2 = 9.488$, df = 4, p-value = 0.05]. Table 12.19 shows the distribution of codes in the patient outcome indicator which were used in the calculation of chi-square. For the seek of completeness of analysis, a chi-square test was used to determine whether improvement, deteriorations and the lack of change were statistically significant events or were random events. Table 12.20 confirms this conclusion and shows that the number of patients who improved at the discharge session is statistically significant and it is unlikely due to chance. Therefore, the second null hypothesis is rejected and the second experimental hypothesis is accepted.

Table 12.18: Chi-square analysis of the number of patients by codes of patient outcome indicators at the start and end

Indicator code	p	At start			At end		
		Observed (O)	Expected (E)	$(O - E)^2/E$	Observed (O)	Expected (E)	$(O - E)^2/E$
1	0.0197	9	0.591	119.646	1	0.591	0.283
2	0.1446	4	4.338	0.026	0	4.338	4.338
3	0.6714	15	20.142	1.313	1	20.142	18.192
4	0.1446	2	4.338	1.260	3	4.338	0.413
5	0.0197	0	0.591	0.591	25	0.591	1008.12
Total	1.0000	30	30.000	122.837	30	30.000	1031.535

A significance level of 95% confidence was set before calculation, P<0.05

Table 12.19: Number of patients by codes of patient outcome indicators at the start and end

Code at end	Code at start					
	1	2	3	4	5	Total
1	1					1
2						0
3	1					1
4	1		2			3
5	6	4	13	2		25
Total	9	4	15	2	0	30

Table 12.20: Analysing data at the level of the group to show improvement, deterioration and the lack of change

State	p	Observed (O)	Expected (E)	$(O - E)^2/E$
Improvement	0.333	29	9.99	36.17
Deterioration	0.333	0	9.99	9.99
Lack of change	0.333	1	9.99	8.09
Total	0.999	30	29.97	54.25

12.3.11 Acceptability

Five physiotherapists were interviewed after the completion of the clinical testing study. All participants found the questionnaire to be useful and informed their clinical decision. Due to the limitations in time and resources patients were not interviewed after the

completion of the study. This step was considered to be assessed after the completion of this thesis. However, physiotherapists were asked to report all cases that refused to continue their assessment using the TELER questionnaire. All individuals with LBP, except for two who initially agreed to participate in this study, continued to use it until the discharge session. The two who refused to be assessed using the TELER LBP questionnaire indicated that the measurement process took a considerable interval of the time (>20 minutes) allocated for their treatment. Thus, they asked not to be measured using the TELER LBP questionnaire.

12.3.12 Feasibility

Participants (five physiotherapists) indicated that the measurement process took a long period of time (>15 minutes) in comparison to the existing tools, such as the VAS (less than 1 minute). Participants agreed that the TELER LBP questionnaire was more informative and it was measuring a construct other than pain intensity. They indicated that the time allocated for measurement decreased dramatically after the initial assessment session. They indicated that once they determined the goals of treatment using the TELER quiz-style indicators, the number of items dropped considerably between the initial assessment session and follow-up sessions. The participants also indicated that they gained more experience after using the TELER questionnaire in the follow-up sessions. Thus, the time required to fill in the questionnaire dropped significantly from more than 20 minutes to less than 5 minutes.

Participants said that the time required to fill in the questionnaire was also determined by the number of items in the questionnaire. Three physiotherapists indicated that patients found some indicators that represent a movement analysis of an activity difficult to understand.

LBP-04: *"It took me some time to fill up the questionnaire in the initial assessment session, but once I familiarised myself with the content, things got easier and it took me less time to assess patients. I really wished that it [the questionnaire] was short and concise. It took me at least 15 minutes to explain the questionnaire to the patient and then allow him to select the questions relevant to his problem, but then once you identify these questions the time drops to 5 minutes. I always verify that the patient understands what he selected".*

12.4 Discussion

The objectives of this study were to examine the measurement properties and clinical utility of the TELER LBP questionnaire in terms of its validity, reliability and responsiveness, as well as judging the outcome measure capability to inform clinical decision-making when used in individuals with LBP in a clinical context and research. In order to assist clinical decision-making, an outcome measure must provide meaningful answers to the following questions (90,457,458):

- What is the functional status of a patient?
- Has a patient's functional status changed?

Clinical knowledge and observations were used in this study to answer these questions. It is important to note at this stage that the primary purpose of this clinical testing study was not to establish the effectiveness of current physiotherapy interventions used in the Jordanian physiotherapy clinics; instead, the aim was to measure changes in the construct *functional performance*. Therefore, interpretations drawn from the study were based on TELER evaluation, not attribution.

In TELER evaluation, clinicians assume that the treatment is effective; therefore, they compare the observed patterns of change or the lack of change to the expected pattern of change or the lack of change in order to examine measurement properties and clinical utility (366). In TELER attribution, the TELER indicators are incorporated into an appropriate research design to identify the cause of an observed pattern of change or a lack of change. The process of attribution is required to determine whether or not an observed pattern of change or the lack of change is unlikely to have occurred by chance. Therefore, clinicians use specific study designs to control for as many known treatment-like effects as possible. This is important to validate the conclusion that the observed pattern of change can be attributed to the treatment in the context of the clinical trial (296).

12.4.1 Validity

In comparison to the ODI (357), RMDQ (274) and QBPDS (279), the TELER LBP indicators were based on sound conceptual models of functional status and appropriate methods of item selection and development. Most current LBP outcome measures have no conceptual framework (279). The face validity and content validity of the TELER LBP indicators were established via a triangulation of methods using semi-structured

interviews with LBP patients [Chapter 9], an NGT with musculoskeletal physiotherapists [Chapter 11] and linking the concepts in the TELER LBP indicators to the ICF core sets for LBP (175). A structured guideline was followed to link the concepts in the indicators to the ICF categories (459). Table 12.19 shows a comparison between the ICF categories in three of the most commonly used back-disability measures and in the TELER LBP indicators. It is clear in Table 12.19 that the TELER LBP indicators represent a wider range of functional performance outcomes relevant to LBP patients than other back-disability scales. This enables the TELER LBP indicators to be more tailored to the different levels of disability which might be encountered among individuals with LBP.

Grocott and Campling (374), p. 32, suggested that "*the validity of TELER indicators is predicated on the use of sound clinical knowledge and evidence to underpin the definitions of the indicators. Ensuring validity of the indicators is ongoing. With new knowledge the indicators are revised. Patients' experiences are captured from their own perspectives. The reliability of the data collected depends on training, accurate assessment and data recording skills*". These recommendations were considered during the process of designing the manual of the TELER LBP questionnaire [Appendices Y and Z]. The manual of the TELER LBP indicators was designed to reflect recent clinical and scientific knowledge and enhances the clarity of the definitions of the indicators.

Convergent construct validity has been used to examine the capacity of measures of LBP to provide accurate representations of the attributes of interest (252). The results showed that the TELER LBP questionnaire correlated moderately ($r = 0.46$) with QBPDS. This was expected because the TELER LBP indicators were developed using clinical and scientific knowledge, whereas the items in the QBPDS relied heavily on statistical calculations during the process of their development (279). This was confirmed through the coefficient of determination (R^2), which showed that scores of the QBPDS were not explained by observations. This means that there is an unknown variable that is affecting the QBPDS scores other than observation.

Table 12.21: Linking the TELER LBP indicators to the ICF categories

Scale	ODI (15 ICF categories)	RMDQ (20 ICF categories)	QBPDS (17 ICF categories)	TELER LBP indicators (26 ICF categories)
ICFDH codes	b 134 (Sleep function)*, b 280 (Sensation of Pain), d 230 (Carrying out daily routine)**, d 4153 (Maintaining a sitting position)**, d 4154 (Maintaining a standing position)*, d 430 (Lifting and carrying objects)**, d 4500 (Walking short distances)*, d 4501 (Walking long distances)**, d 5 (Self-care), d 7702 (Sexual relationship), d 9 (Community, social and civic life), d 920 (Recreation and leisure), e 1101 (Drugs), e 1150 (General products and technology for personal use in daily living), e 1201 (Assistive products and technology for personal indoor and outdoor mobility and transportation)**,	b 1302 (Appetite), b 134 (Sleep function)*, b 152 (Emotional function), b 28013 (Pain in back), d 230 (Carrying out daily routine)**, d 410 (Changing basic body position)**, d 4102 (Kneeling)**, d 4105 (Bending)**, d 4106 (Shifting the body's centre of gravity), d 4154 (Maintaining a standing position)*, d 450 (Walking), d 4500 (Walking short distances)*, d 4551 (Climbing)**, d 465 (Moving around using equipment)**, d 540 (Dressing), d 5402 (Putting on footwear)**, d 570 (Looking after one's health), d 845 (Acquiring, keeping and terminating a job), d 850 (Remunerative employment), e 3 (Support and relationship),	b 134 (Sleep function)*, d 2100 (Undertaking a simple tasks), d 410 (Changing basic body position)**, d 4105 (Bending)**, d 4153 (Maintaining a sitting position)**, d 4154 (Maintaining a standing position)*, d 430 (Lifting and carrying objects)**, d 4450 (Pulling), d 4451 (Pushing), d 4454 (Throwing), d 4500 (Walking short distances)*, d 4501 (Walking long distances)**, d 4551 (Climbing)**, d 4552 (Running)**, d 470 (Using transportation), d 5402 (Putting on footwear)**, d 640 (Doing housework),	b134 (Sleep function[A1])*, d 230 (Carrying out daily routine [M1])**, d 410 (Changing basic body position [B2, B3, C1, D1, D2])**, d 4100 (Changing basic body position- [B1])**, d 4101 (Squatting [H1, H2]), d 4102 (Kneeling [D3])**, d 4103 (Sitting [C1, D1, D2, D3]), d 4104 (Standing [C1, D1, D2, D3, H1, H2]), d 4105 (Bending [G1, G2])**, d 4150 (Maintaining a lying position [A1]), d 4153 (Maintaining a sitting position [E1])**, d 4154 (Maintaining a standing position [F1])*, d 4300 (Lifting [L1])**, d 4301 (Carrying in the hands [L1, L2, L3]), d 4305 (Putting down objects [L3]), d 4500 (Walking short distances [I1, I2, I3])*, d 4501 (Walking long distances [I3])**, d 4502 (Walking on different surfaces [I1]), d 4503 (Walking around obstacles [I1]), d 455 (Moving around [J1]), d 4551 (Climbing [K1, K2, K3, K4, K5])**, d 4552 (Running [J2])**, d 4600 (Moving around within the home [I2]), d 4602 (Moving around outside the home and other buildings [I3]), d 465 (Moving around using equipment [I4])**, e 1201 (Assistive products and technology for personal indoor and outdoor mobility and transportation [I4])**,

Adapted from Wang et al. (210)

ODI: Oswestry disability index; RMDQ: Roland-Morris disability questionnaire; QBPDS: Quebec back pain disability scale; ICFDH: International Classification of Function, Disability and Health.

**: The ICF code is shared between the ODI, RMDQ, QDBS and TELER LBP indicators.*

***: The ICF code is shared between at least two scales.*

12.4.2 Reliability

A highly reliable measurement tool has the potential to show greater validity and sensitivity to change (460,461). This study suggests that the inter-rater reliability and the internal consistency of the TELER LBP questionnaire were excellent. Table 7.2 shows the psychometric properties of three commonly used back-disability scales. The inter-rater reliability of these measures was not tested. The value of Cronbach's alpha, the coefficient of reliability, of the TELER LBP questionnaire was higher than the values of current LBP measures. The results support further testing concerning the potential superiority of the TELER LBP questionnaire over other LBP measures. Further testing in different settings and a larger population would provide an evidence that supports the findings of this study.

Errors in measurement were reduced in this study by ensuring that the *observer* had adequate knowledge, training and skills in identifying and documenting a *real* change when it happened in a systematic and consistent manner. Consistency was ensured by defining TELER codes using statements that have a singular meaning, so it can be interpreted in one way only. Measurements in this study were jointly performed by LBP patients and physiotherapists. Physiotherapists received training on the TELER method by an expert who educated them about the concepts and showed them how to use the TELER software, entry of data and producing of patients' reports.

Further examination of the findings of the inter-rater reliability testing suggested that the second observer who was not responsible for looking after the patients was always recording one code fewer than the first observer [the physiotherapist who was responsible for delivering interventions] when disagreement was recorded. One explanation could be that the second observer was stricter when verifying scores than the first observer who maybe was more optimistic and inclined to discharge the patient. These findings require further investigation in future research.

12.4.3 Responsiveness

The pilot study applied two different methods for evaluating the TELER LBP questionnaire's ability to detect change accurately. The findings of these tests showed that the TELER LBP questionnaire was sensitive to change or the lack of change more than the QBPDS. In comparison to TELER, 19 points are required to overcome the

standard error of measurement in the QBPDS. A change between two successive codes in a TELER indicator represents a minimal detectable change and each code in a TELER indicator denotes a clinically significant outcome (342). The clinical knowledge of many experts was used in the construction of codes to ensure that they were mutually exclusive and exhaustive. These factors minimised measurement errors in the TELER LBP indicators. The TELER LBP indicators were more responsive to change than the QBPDS because the latter lacked precision. The definitions of TELER codes allowed the recording of more clinically significant changes than QBPDS. This is because the codes represent clinically significant outcomes that are meaningful to the individuals with LBP and healthcare professionals; therefore, these changes could be observed, recognised and recorded.

12.4.4 Clinical utility

One of the limitations of the current LBP measures is that they were developed for group decision-making in a research context rather than individual patient decision-making in a clinical context (252). The results of this study showed that 29/30 LBP patients experienced clinically significant changes and 28/30 experienced at least one statistically significant change. The QBPDS was used also in this study, but it did not provide similar information that could be used to inform the process of clinical decision-making.

The TELER indices used in the quantitative analysis at the level of the individual provide means for interpreting patients' outcomes with reference to management records, performance records and clinical notes. These indices guided clinical decision-making by identifying accurately undesirable outcomes such as a deterioration or a lack of change. The TELER software provided session-by-session (longitudinal follow-up) measurement of changes in functional performance during physiotherapy. It is the responsibility of the clinician to respond to the recorded changes, whether an improvement or deterioration. The response might be in the form of maintaining treatment, altering treatment or withdrawing treatment.

Linking clinical notes and patient records to the performance record helped in identifying contextual factors that might influence functional performance, which included personal and environmental factors. It also enabled clinicians to generate explanations of changes experienced by the patient.

Quantitative analysis at the level of the group showed that by the end of physiotherapy all participants had experienced either an improvement or no change. There was a statistically significant difference in the distribution of TELER codes at the beginning of physiotherapy and at the discharge session. These patterns of clinically significant changes happened in the majority of patients (n = 28). Within the limitations of an observational study, it is difficult to attribute these changes only to physiotherapy interventions. However, the only things that participants had in common during the period of this study were ***LBP*** [the condition] and ***physiotherapy interventions*** [management]; therefore, it is likely that these patterns of changes in functional performance outcomes are induced by physiotherapy interventions. This hypothesis requires further testing in a different study design (e.g. randomised control trial) to establish a causal relationship between physiotherapy interventions and improvement in functional performance in individuals with LBP.

The quantitative analysis at the level of the group showed that the majority of participants achieved good outcomes and the pattern of improvement was relatively stable. This might suggest that patients confronted their pain, were able to cope with their LBP symptoms and remained active during the study period. The Variability Index indicated that instability was frequently associated with old age. The pattern of recovery was heterogeneous across the group with some LBP patients experiencing a small improvement in all indicators and others experiencing a large improvement in a small number of indicators.

12.5 Conclusion

This study has contributed to the knowledge about the pattern of recovery and trajectory of LBP in Jordanian individuals with LBP. The quantitative and qualitative analyses of the data collected in this study showed that the TELER LBP questionnaire is valid, reliable, responsive to change and provided useful information that helped in clinical decision-making. The TELER LBP questionnaire was found to be a useful clinical tool that possesses the potential to be used in both research and clinical contexts.

Chapter 13: The overall discussion

Key points in Chapter 13:

- There were many objectives identified at the different phases in this thesis; these have been synthesised in this chapter into five clear objectives in order to have a clear structure of the new knowledge developed in this thesis.

- This chapter aims to critically review the methods used in this research programme to support the conclusion that a new outcome measure of functional performance for individuals with LBP was developed following a rigorous research process, which was underpinned by the theory of measurement and clinical knowledge.

- This chapter considers the implications of research that has been conducted with reference to each aim or objective stated in this thesis.

- The extent to which new knowledge (Box 13.1) has been produced is considered alongside some recommendations for further research in this field.

Box 13.1: Summary of the main contributions of this thesis

This thesis has:

- Provided an up-to-date in-depth understanding of LBP and its management.
- Provided an in-depth understanding of the theory underpinning measurement of LBP in a clinical context.
- Developed a theoretical framework for the measurement of LBP in a clinical context.
- Developed a comprehensive and in-depth understanding of the impact of LBP on Jordanian individuals with LBP, and determined clinically significant outcomes following physiotherapy.
- Developed a new LBP outcome measure of functional performance that is valid, reliable and responsive to change or lack of change that will enable the development of further knowledge in the field when used in research or clinical contexts.

13.1 Purpose of the thesis

In the context of a prevalent, costly and poorly understood condition, the aim of this thesis was to develop an appropriate outcome measure that will help individuals with LBP and assist clinicians to better understand the clinical course of the condition. It also aims to help them make informed decisions on whether to continue treatment, change interventions, discharge the patient or refer him or her to other services. This research

was conducted on the backdrop of an ongoing strategic plan at the Ministry of Health in Jordan to significantly enhance health services research and stimulate an evidence-based practice paradigm to deliver high quality health services (20,21). These challenges could not be met without the development of an appropriate outcome measures that will provide informative data about the outcome of treatment (19,462). The findings of this research suggest that the overarching aim has been met with indications of the potential superiority of the characteristics of the new outcome measure in comparison to the current LBP 'assessment tools'.

Underpinning the overarching aim were several objectives. The amount to which each has been accomplished and the implications of the work that has been conducted will now be considered in turn.

13.1.1 Objective one

To provide an up-to-date in-depth understanding of LBP and its management.

This thesis began with an exploration of the impact of LBP on the healthcare systems and on individuals living in the Middle East, especially in Jordan. To achieve this objective, a rigorous systematic review was conducted in Chapter 1 to identify epidemiological studies that examined the prevalence and natural history of LBP in the Middle East and worldwide. The initial search did not retrieve any population-based epidemiological studies conducted in Jordan or any of the surrounding Arabic countries. The updated systematic review in the first chapter of this thesis concluded that there were no significant differences in the reported prevalence of LBP among countries in different continents; therefore, it is suggested that the prevalence of LBP in Jordan is unlikely to be different from the rest of the world. However, the natural history of the condition was different among countries, and until this stage, there has been no study that investigated the natural history or the clinical course of LBP in Jordan. A recent study suggests that there were different recovery pattern, and that the current understanding of LBP and its consequences would be supported by detailed knowledge of the clinical course of LBP and the factors linked to its transition from trivial to burdensome condition (463). The acquisition of this detailed knowledge of the course of the condition and associated factors requires an appropriate outcome measure that traces change in the individual patient. This work filled this gap by developing a new measurement tool, the TELER LBP

questionnaire, which is appropriate for measuring the impact of pain on functional performance in a clinical context.

In addition to this, the quality assessment list used to review the articles included in the systematic review showed that majority of the epidemiological studies used inappropriate outcome measures, which might distort the current understanding of LBP. To understand these shortcomings in the musculoskeletal field, Chapters 2–4 in the first phase were dedicated to understanding the impact of LBP on individuals' lives and on the critically reviewed management models of LBP, models of pain and functioning. This modern and in-depth knowledge of LBP and its management provided a sound theoretical framework that was used later on in the second and third phases to develop the TELER LBP questionnaire.

The findings of phase one suggests that LBP is a self-limiting condition, but that recurrence is common. A small proportion of individuals severely affected by the condition accounts for most health- and disability-related costs. Low back pain affects an individual's physical abilities, which in turn affects other aspects of quality of life, such as mood and social functioning. Due to this, LBP is considered a highly diverse condition, and there is mounting evidence supporting targeted multidisciplinary interventions for its management.

13.1.2 Objective two

To provide an in-depth understanding of the theory underpinning measurement of LBP in a clinical context.

The findings of the first section in the conceptualisation phase suggest that a clinical measurement tool is required. The second section in the conceptualisation phase is dedicated to determining the required characteristics in a measurement tool to be suitable for use in a clinical context. This objective is achieved in Chapters 5 and 6. Chapter 5 suggests that the construct *functional status* can be evaluated in the initial assessment session to examine an individual's physical abilities, and in follow-up sessions, to trace changes in the patient's health status. In comparison to the other dimensions of quality of life, only the changes in *functional status* can be reported by individuals with LBP and observed by clinicians. An analytical framework of this construct was identified earlier in Chapter 4. This framework suggested that the level of functional performance varies

between patients, and that each patient performs at a different level across a continuum of performance (Connectivity). This means that an individual who possesses a higher functional capacity can perform more tasks than another person who possesses less functional capacity, who also in turn can perform more tasks than a patient with a disorder that affects any of the components of *functional status* (216). This thesis suggests that there is a symmetry between the mathematical structure of the construct 'functional performance' and the characteristics of an *ordinal scale* of measurement (connectivity, transitivity and asymmetry). The Guttman scaling method can be used to construct ordinal scales that describe recovery patterns of physical activities. The theoretical framework of clinical measurement in a clinical context developed at the end of the conceptualisation phase is based on these findings. The standards of measurement in a clinical context are identified in Chapter 6.

Chapter 6 suggests that clinical measurement tools should possess, apart from adequate psychometric properties, the ability to measure clinically significant changes in the construct of interest at the level of the individual, detect early deterioration and provide clinically informative data that will enable the process of making swift and decisive decisions related to the management of the condition.

The theoretical principles of measurement in a clinical context identified in Chapters 5 and 6 are used in Chapter 7 to critically review current LBP instruments for measuring pain and disability. It is unclear whether or not the questions in the current scales reflect what is important to individuals with LBP. It seems that these measurement tools lack an appropriate conceptual framework, which negatively affect their validity. Regardless of the psychometric properties of the current LBP measures, some of the items in these measures are inappropriate because some of the items, for example each question within the ODI, lack specificity by measuring more than one thing at the same time. Moreover, the response choices in the current measures are not suitable for use in a clinical setting. Current LBP scales provide *data* (meaningless numbers) that cannot be used readily to inform clinical decision-making.

The conceptualisation phase indicated that the current LBP outcome measures were not suitable for use in clinical musculoskeletal settings for many reasons. Hence, the purpose of the following phases in this research programme was to create a new valid, reliable and sensitive measurement tool that is suitable for use in a clinical musculoskeletal

context. It is important to note that the first phase did not only identify the need for developing a new outcome measure, but also helped to shape and construct a new theoretical framework that offered a basis and stimulus upon which to conduct further useful research.

13.1.3 Objective three

To develop a theoretical framework for measurement in research and clinical contexts

In comparison to the rising number of documents that provide guidance on the development and evaluation of complex interventions, such as the framework developed by the Medical Research Council (296), no document provided similar guidance on the development of outcome measures that trace changes in a clinical context. This thesis responded to this gap by demonstrating an example of a rigorous process for developing a clinical measurement tool that can be easily transferred to other areas in the healthcare field. This thesis has enhanced the knowledge in the area of measurement in a clinical musculoskeletal context by reviewing models of functioning and developing a new framework for the measurement of functional performance in individuals with LBP. This was achieved through the consideration of the theoretical knowledge of LBP and its management and models of functioning in the conceptualisation phase, which in turn enabled the selection of appropriate methods in the development and clinical testing phases.

The TELER method was used in the development phase because it fulfilled the theoretical underpinning identified in the conceptualisation phase. This method has a clear conceptual framework for developing outcome measures for both the research and clinical contexts. A lesson learnt in this work is that it is the responsibility of the user (a clinician or a researcher) to ensure that the definition of the TELER indicator represents an individualised outcome using their clinical knowledge.

In the TELER method, it is important to distinguish between *a clinically significant outcome* and *a clinically significant change*. A clinically significant outcome is the construct of interest, and it should be defined from the perspective of the patient. A clinically significant change is the change experienced by the patient and observed by the clinician in the *clinically significant outcome*. In this thesis, clinical significant changes were defined according to experts' opinion and theoretical established knowledge, and

not according to patients' opinion for two main reasons. Firstly, different patients have different LBP experiences. It is illogical to assume that all LBP patients have experienced the full trajectory of change from complete loss of functioning to maximum functioning. It is highly unlikely that patients might arrive at a consensus around the recovery pattern. Secondly, it is illogical to assume that individuals with LBP are able to fully remember all stages of functional loss as they developed.

13.1.4 Objective four

To gain a comprehensive understanding of the impact of LBP on Jordanian individuals with LBP

This objective was achieved in Chapter 9 using qualitative methods. When developing a new outcome measure, it is necessary to explore and determine the desired outcome. As was indicated earlier in the conceptualisation phase, there was no study that explored the impact of LBP on Jordanian individuals; therefore, a qualitative study was conducted as part of this doctoral programme. People from the north, middle and south of Jordan were interviewed. Participants represented a heterogeneous sample of the Jordanian population. The study followed a rigorous research process to ensure the trustworthiness of the findings. The findings of the qualitative study suggested that i) LBP is a multidimensional experience and ii) LBP impacts on functional performance and is affected by other constructs, such as social functioning, mental functioning and spiritual practices. This qualitative study suggested that spirituality played a key role in coping with LBP. The qualitative study indicated that restoring physical functioning emerged as a main theme on the thematic chart. The narratives of the patients were used to determine clinically significant outcomes. They were also used in the construction of the TELER LBP questionnaire.

13.1.5 Objective five

To develop a new LBP outcome measure of functional performance that is valid, reliable and responsive and that informs clinical decisions in a clinical context

This objective was met in Chapters 11 and 12. The validity of the TELER LBP indicators was ensured by adequate theoretical conceptualisation of the construct and empirical qualitative evidence. This included referring to the experience of functional limitations

by individuals with LBP and the clinical perspectives of experts. Nominal group technique was used as a valid method of item selection and reduction that preserved patients' perspectives [Chapter 11]. The clinical testing study presented evidence of the validity, reliability and responsiveness of the TELER LBP questionnaire. It was also interesting to find some indications that support the superiority of the measurement properties of the TELER LBP indicators in comparison to the current LBP scales. Statistical tests showed excellent reliability, sensitivity to change and high specificity.

The TELER functional indicators provided detailed information about patient functional status at the individual level. This information identified whether the patient was improving, deteriorating or did not change during treatment. According to these information, different clinical actions were taken. TELER LBP indicators provided a longitudinal trace of changes, which enabled individuals with LBP to detect any deterioration or lack of change when it occurred. Evidence of clinically significant change was established through the observation of that change.

Measurement at the individual level provided LBP patients and clinicians with important information for making informed clinical decisions in response to the observed and documented changes in functional performance. Appropriate measurement of physiotherapy outcomes in a clinical context enables therapists to notice deteriorations once they happen and to act on them. The TELER LBP questionnaire provided useful information, such as clinical characteristics of the group of LBP patients and the overall outcome of treatment at the managerial level.

In the authors' knowledge, the TELER LBP questionnaire is the only measurement tool in the musculoskeletal field that enables the calculation of a quantitative estimation of the variability of the clinical condition at the individual level.

13.2 A reflection on the appropriateness of the methods used in this research

In the world of patient-centred care in physiotherapy practice, the development of a tool for measuring outcomes in clinical settings requires an innovative approach. The traditional approaches for outcome measure development depend heavily on experts' knowledge and on the use of statistical tests to construct new outcome measures. This study adopted the stance that expertise on the impact of LBP (clinical significant outcomes) lay not only in the musculoskeletal literature and experts' opinions, but also

within the individuals with LBP. It is these people who observe and experience changes in their physical abilities, and their knowledge has been kept in the forefront during all stages of the process of instrument development. The second phase in this research programme started with an exploration of a suitable method of measurement in the physiotherapy literature. The TELER method was selected for many reasons. Firstly, it was selected because it was specifically designed to trace changes in the desired outcome at the individual level, as well as on the group level. Secondly, it facilitated a partnership between the observer who is recording the scores and the respondent who is experiencing the health problem and reporting the change. Thirdly, this method was grounded in the patients' narratives, and it fulfilled the theoretical underpinnings identified during the conceptualisation phase. Fourthly, it has been used in other studies in the field of physiotherapy, particularly in the measurement of individualised outcome.

The TELER indicators were developed from patients' narratives, movement analysis studies and amending existence TELER indicators. A NGT was then used in the fourth step in this research programme to examine the face and content validity of the first draft of the TELER LBP questionnaire.

The new TELER LBP questionnaire was then piloted in the Jordanian physiotherapy clinics. A rigorous research process that examined different measurement properties using a combination of qualitative and quantitative methods was adopted. The findings of the clinical testing study indicated that the pre-testing version of the TELER LBP questionnaire was valid, reliable and responsive to change at the individual and group level. A qualitative study conducted after the completion of the clinical testing phase concluded that the TELER LBP questionnaire provided informative data that guided the decision-making process, and recommended using the new outcome measure in the physiotherapy clinics in Jordan.

13.3 Limitations of the clinical testing study

The TELER LBP indicators were validated from the perspective of clinicians involved in the development of the measurement tool phase. It is highly unlikely that this will affect the validity of the TELER LBP questionnaire because it was originally developed from the patients' narratives.

The findings of the clinical testing study were based on a prospective longitudinal follow up of cohort of individuals with LBP over a period of four months. Causality could not be established between physiotherapy interventions and changes in the patients' functional status. Establishing causality requires implementing the TELER LBP questionnaire in an appropriate research design, such as a randomised controlled trial.

The findings of the clinical testing study were limited by the small sample size and lack of randomisation, which limited the generalisability of the findings or of the establishment of a causal relationship between physiotherapy and improvement in the patient's functional performance. It is important to note that the sample size was a true representation of the actual number of individuals with LBP at the sites of clinical testing. The aim is to evaluate the measurement properties of the newly developed TELER LBP questionnaire within a real clinical context. It is important to interpret the findings within the context and design of the clinical testing study. The sample size and the study design provide a realistic insight on the physiotherapy practice in Jordan

13.4 Recommendations for future directions

Future research includes four main directions. These are developing new TELER LBP indicators, implementing the TELER LBP in different appropriate research designs, using the questionnaire in a larger population to examine the clinical course patterns of functional recovery in a larger sample of individuals with LBP and comparing the TELER LBP indicators with existing measures.

13.4.1 Developing new TELER LBP indicators

The validity, reliability and responsiveness of the TELER LBP indicators were established using a combination of quantitative and qualitative methods. The codes in the TELER LBP indicators are the only available descriptions in the musculoskeletal literature concerning the patterns of functional recovery in a population of individuals with LBP. It is plausible that new patterns of functional recovery might emerge in the future. The conceptualisation phase suggests that LBP is a heterogeneous condition and that the recovery patterns of individuals with LBP might differ. A possible solution to overcome such a situation is provided by the flexibility of the TELER method. Grocott and Campling (374) suggested that the validity of the TELER indicators is an ongoing process; with the emergence of new knowledge, the TELER codes are revised.

13.4.2 Implementing the TELER LBP in different appropriate research designs

The TELER LBP questionnaire can be implemented in appropriate research designs, such as a randomised controlled trial, to evaluate the causal chain links between physiotherapy interventions and improvements in the outcomes of individuals with LBP. This might enhance the current understanding of how complex interventions work and what is the effect of these interventions on the construct of functional status (296).

13.4.3 Examining the clinical course patterns of functional recovery in a larger sample size of individuals with LBP

Variations in the clinical course are a recognised clinical feature of LBP (463). Low back pain might be better understood by the recognition of these variations. One approach to recognise these variations is through the identification of clinical course patterns. A prospective observational cohort study might identify LBP trajectories using the TELER LBP questionnaire over one year, and compare the findings obtained using different analytical approaches.

13.4.4 Comparing the TELER LBP indicators with existing measures

The clinical testing study presented an evidence that indicated the superiority of the TELER LBP questionnaire in comparison to the QBPDS. Further comparisons against other LBP assessment tools in different populations might support this conclusion and add more weight to the evidence that support the superiority of the measurement properties of the new measurement tool developed in this research programme.

13.5 Dissemination and communication of the research findings

The findings of the systematic review has been submitted to a peer-reviewed journal.

- Altaim, T., Littlewood, C., Mawson, S. (2015). Examining the impact of research design on low back pain prevalence rates. Systematic Reviews Journal. (In the review process).

The findings of the qualitative study were communicated in an oral presentation in national and international conferences.

- Altaim, T., Littlewood, C., Tod, A., Mawson, S. (2013). Exploring the multidimensional experience of people with low back pain: A qualitative study. PhysiotherapyUK 2013. Chartered Society of Physiotherapy.

- Altaim, T., Littlewood, C., Tod, A., Mawson, S. (2013). Exploring the multidimensional experience of people with low back pain: A qualitative study. JPTS scientific day. Jordanian Physiotherapy Society.
- Altaim, T., Littlewood, C., Tod, A., Mawson, S. (2014). Development and measurement properties testing of the TELER LBP questionnaire. ScHARR PGR conference. Sheffield University.

The findings of the cross-cultural adaptation of the QBPDS was published in a peer-reviewed journal.

- Altaim, T., Littlewood, C. (2011). Cross cultural adaptation of the Quebec Back Pain Disability Scale from English into Arabic. International Journal of Physiotherapy and Rehabilitation. 1 (2) 4-13.

A journal publication plan:

- Altaim, T., Littlewood, C., Tod, A., Mawson, S. (2015). Exploring the impact of LBP on Jordanian people's lives: A qualitative study. Physiotherapy.
- Altaim, T., Littlewood, C., LeRoux, A., Mawson, S. (2015). The TELER LBP questionnaire: conceptualisation and development. Physiotherapy.
- Altaim, T., Littlewood, C., LeRoux, A., Mawson, S. (2015). The TELER LBP questionnaire: measurement properties. Physiotherapy.

13.6 Conclusion

This research programme offers a new and valuable insight into the understanding of measurement in a clinical context. This was achieved through robust, rigorous and interlinked research methods. This thesis did not only succeed in developing a new LBP outcome measure of functional performance for individuals with LBP, but also developed a new theoretical framework of measurement in a clinical context that can be used in other areas in the field of physiotherapy.

The measurement tool developed in this thesis was validated to be used in clinical settings but it also has the potential to be used in a research context to generate new knowledge in the field of physiotherapy. Regardless of the advancements achieved in this thesis, it is clear that there are still many unanswered questions. Nevertheless, a solid base upon which further knowledge can be developed has been established.

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Appendices

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Appendix Z: Manual of TELER LBP questionnaire (Arabic)

Appendix A: Letter to Jordanian hospitals

The University Of Sheffield.

School Of Health And Related Research.

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Date: 09/August/2012
To the head of Albashir Hospital,

Thamer Altaim is a PhD student at the Faculty of Medicine, Dentistry and Health, School of Health and Related Research (ScHARR) at the University of Sheffield in the United Kingdom. He is a qualified physiotherapist from the Jordanian Ministry of Health in Jordan and the Health Professional Council in the United Kingdom. He is conducting a research to investigate the impact of low back pain on people in Jordan.
Thamer was given full ethical approval from Sheffield Hallam University ethics committee which is also recognized and equivalent to the ethics approval from the University of Sheffield (the ethics approval letters are attached here).
Would you please give him ethics approval in order that he can undertake his PhD research under the title: "To develop a culturally sensitive clinical outcome measurement tool for individuals receiving physiotherapy management for chronic low back pain in Jordan".
The research work will be done by the researcher as following:

- Interviewing 10 low back pain patients at the physiotherapy department Albashir hospital.
- Interviewing 10 physiotherapists who treat low back pain patients at the physiotherapy department in Albashir hospital.

Susan Mawson

Professor Sue Mawson MCSP Bsc (Hon) PhD
Director of the National Institute for Health research, CLAHRC
Professor of Health Services Research

Appendix B: Information sheets for the qualitative study

The University Of Sheffield.

Information sheets and consent forms

Participant information sheet (Low back Pain Patients)

Study title	**Exploring the characteristics of an outcome measurement tool for chronic low back within a Jordanian health care context**
Principal researcher	Thamer Ahmad Altaim
Telephone number	+962 (0) 7 85-818-800

Study Sponsor: The University of Sheffield, United Kingdom.

We would like to invite you to take part in our research study. Please, before you decide we would like you to understand the purpose of this research and what it would request you to be involved-in. Ask us if there is anything that is not clear.

Participant name:

Date:

You will be given a copy of this information sheet to keep for your own record.

1

1. What is the purpose of this study?
The purpose of this research is to study the impact of Low Back Pain on your life.

2. Why I have been invited?
You have been invited because your doctor has referred you to physiotherapy.

3. Do I have to take part?
Your decision to take part in this study is entirely voluntary. You may refuse to participate or you can withdraw from the study at any time and without any given reasons. Your refusal to participate or desire to withdraw would not influence the standard of care you will receive.

4. What will happen to me if I take part?
If you participate in the study, you will be required to attend an interview or a discussion group regarding the research topic. No further participation will be required from you.

5. Expenses and payment
You will not be paid for taking part in this study.

6. What do I have to do?
If you agree to take part in the study we will ask you to attend an interview or a focus group regarding the research topic.

7. What are the possible disadvantages and risks of taking part?
There are no disadvantages or risks in taking part in this study.

8. What are the side effects of any treatment received when taking part?
No side effects for taking part in this study.

9. What are the possible benefits of taking part?
There are no clinical / personal benefits to you if you decided to take part in this study. However, the information extracted from this part of the study will help us in the future to improve our understanding and knowledge about low back pain. The aim of this part of the study is to explore your views about how low back pain affects you in your daily life.

10. What if there is a problem or I want to complain?

If you have any queries or questions please contact:
The director of studies: Prof. Sue Mawson
Email: s.mawson@sheffield.ac.uk

11. Will my taking part in this study be kept confidential?
All information that is collected / recorded about you during the study will be kept safe and secure. Electronic data will be kept on a secured laptop and recoded data will be kept in a secured locker. The documents relating to the administration of this research, such as the consent form you sign to take part, will be kept in a folder called a site file or project file. This is locked away securely. The folder might be checked by people in authority who want to make sure that researchers are following the correct procedures. These people will not pass your details to anyone else. The documents will be destroyed five years after the end of the study.

12. What will happen to the results of the research study?
The results of this study will be discussed with the supervisory team anonymously. It is anticipated that the results will be published in a peer reviewed journal. However, those who are interested on study results will be sent a newsletter that shows these results.

13. Who is sponsoring the study?
The sponsor of this study is the University of Sheffield, United Kingdom.

14. Who has reviewed this study?
This study is approved by Sheffield Hallam University Research Ethics Committee. This Committee is run by Sheffield Hallam University but its members are not connected to the research they examine. The Research Ethics Committee has reviewed this study and given a favourable opinion.

15. Further information and contact details
Please contact the main researcher: Thamer Ahmad Altaim
Email address: thamerpt@live.co.uk
Phone number: +962-7-85-818-800

The University Of Sheffield.

صفحة المعلومات الخاصة بمرضى الم اسفل الظهر المشاركين بالبحث

عنوان الدراسة	**استكشاف خصائص اداة قياس مخرجات العلاج لمرضى الم اسفل الظهر في سياق النظام الصحي الأردني**
اسم الباحث	**ثامر احمد عبدالكريم التيم**
رقم الهاتف	+962 (0) 7 85-818-800

الجهة الراعية للدراسة: جامعة شيفلد – المملكة المتحدة (بريطانيا)

نحن نود دعوتك للمشاركة في هذا البحث. نرجو منك قبل اعطاء القرار بالمشاركة بالبحث، فهم السبب لعمل هذا البحث و ما هو المطلوب منك عند المشاركة فيه. نرجو منك عدم التردد في سؤال الباحث عن اي معلومة غير واضحة لديك.

اسم المشارك	
التاريخ	

سوف يتم إعطاءك نسخة خاصة بك من ورقة المعلومات لتحتفظ بها عند الحاجة اليها.

The University Of Sheffield.

1. ما هو الهدف من إجراء هذا البحث؟

الهدف من إجراء هذا البحث هو دراسة و فهم تأثير مرض الم اسفل الظهر على حياتك.

2. لماذا تمت دعوتي للمشاركة بهذا البحث؟

تمت دعوتك للمشاركة بهذا البحث لانه تم تحويلك لقسم العلاج الطبيعي لتلقي العلاج الخاص بالم اسفل الظهر.

3. هل يتوجب علي المشاركة بهذه الدراسة؟

قرار مشاركتك بهذا البحث هو بشكل كلي قرار اختياري تطوعي. يمكنك عدم المشاركة بهذا البحث، كما يمكنك الانسحاب من البحث في اي وقت و حتى من غير اعطاء الاسباب. يرجى ملاحظة ان مشاركتك بالبحث تهمنا و تساعد طاقم البحث الطبي على فهم مشكلتك و دراسة تأثير الم اسفل الظهر على حياتك. يرجى ملاحظة انه اذا كنت ترغب بعدم المشاركة بهذا البحث فهذا لن يؤدي للتأثير على خطة علاجك الحالية او الخدمات الصحية المقدمة اليك.

4. ماذا سيحدث إذا قررت المشاركة بهذا البحث؟

إذا قررت المشاركة بهذا البحث، فسوف يتم دعوتك لمقابلة شخصية خاصة مع الباحث.

5. المصاريف و الدفعات المالية

يرجى منك ملاحظة ان طاقم البحث لن يكون مسؤول عن دفع اي مبالغ مالية للمشاركة بهذا البحث.

6. ما هو الشئ الذي يجب علي القيام به؟

اذا قررت الموافقة و الاشتراك بهذا البحث، فهذا سيتطلب منك الحضور لمقابلة شخصية تتراوح مدتها عادةً ما بين 15 الى 45 دقيقة مع الباحث. سوف يتم اجراء المقابلة في غرف الاجتماعات بالمستشفى او عيادة العلاج الطبيعي في اي وقت مناسب للمريض.

7. ماهي المشاكل و الاخطار المحتملة من المشاركة بهذا البحث؟

تم تقييم هذا البحث من قبل لجان اخلاقيات الابحاث في المملكة المتحدة من قبل طواقم طبية و اكاديمية متخصصة. تم الموافقة على انه لا يوجد مخاطر و لا مشاكل مترتبة على المشاركة في هذا البحث.

8. ما هي الاعراض الجانبية لاي علاج يتم تلقيه عند المشاركة في هذا البحث؟

ليس هنالك أي أعراض جانبية للمشاركة في هذا البحث. هذا البحث لا يتطلب استخدام اية ادوية او مواد طبية/كيميائية عند المشاركة بالدراسة.

9. ما هي الاستفادة الناتجة من المشاركة بهذا البحث؟

مشاركتك بالبحث تهمنا جداً لفهم مشكلة الم اسفل الظهر و كيفية تاثير هذه المشكلة على حياتك. يرجى ملاحظة ان نتائج هذه الجزئية من البحث قد تشكل جزء هام من عملية تطوير الخدمات الطبية المقدمة و الارتقاء بجودة العلاج في القطاعات الصحية مستقبلاً.

10. ماذا لو كان هنالك مشكلة و اردت ان اشتكي؟

اذا كان لديك اية مشكلة تتعلق بالبحث او اي استعلام يمكنك الاتصال على مديرة الأبحاث الطبية، كلية الطب و طب الاسنان – جامعة شيفلد في المملكة المتحدة البروفيسور سوزان ماوسن على البريد الإلكتروني التالي

Email: s.mawson@sheffield.ac.uk

11. هل مشاركتي في هذه الدراسة سوف تعامل بسرية؟

أي معلومات تتعلق بالمريض أو أي معلومات تقوم بطرحها خلال هذا البحث سوف تعامل بسرية تامة و يتم المحافظة عليها بطرق أمنة. يرجى ملاحظة ان المعلومات سوف يتم تسجيلها إلكترونياً عن طريق جهاز تسجيل صوتي مشفر و سوف يتم تحميلها فوراً على جهاز محمول يعمل فقط عن طريق بصمة الإصبع و كلمة مرور مركبة. اي معلومات يتم تسجيلها على الورق او اوراق الاقرار بالمشاركة في هذه الدراسة سوف تحفظ في مكان آمن بخزانة مغلقة. يرجى ملاحظة ان أي معلومات مقدمة من قبلك لن يتم تداولها مع أي جهة بستثناء طاقم البحث في المملكة المتحدة حيث أنهم يستطيعون الوصول الى المعلومات المقدمة من غير معرفة من قام بالادلاء بها أو من قام بتوفير هذه المعلومات (المريض).

12. ماذا سوف يحدث لنتائج البحث؟

سوف تتم مناقشة نتائج الدراسة مع طاقم الإشراف الخاص بالبحث في المملكة المتحدة و بشكل سري تام. حيث أنه من غير المسموح معرفة من هو المريض الذي قام بتوفير المعلومات الخاصة بالبحث. سوف يقوم الباحث بتعيين رقم مميز لكل مشارك في البحث للعودة اليه عند تنظيم المعلومات وطرحها على طاقم البحث في المملكة المتحدة. البحث يقوم على دراسة المعلومات الموفرة و التي تتعلق بالمرض و ليس بدراسة المرضى انفسهم. و لكن يمكن للمرضى المشاركين بالبحث الاطلاع على النسخة النهائية من نتائج البحث بعد الحصول على الموافقة الرسمية لنشر نتائج البحث.

13. من هي الجهة الراعية لهذا البحث؟

هذا الدراسة هي برعاية جامعة شيفلد، المملكة المتحدة.

14. من هي الجهات التي قامت بمراجعة بروتوكول البحث؟

تمت مراجعة هذا البحث عن طريق لجان طبية و اكاديمية مستقلة في جامعة شيفلد هلام ، المملكة المتحدة و قامت هذه اللجان بالموافقة على إكمال هذا البحث من دون إحداث إي تغييرات على بروتوكول البحث. تم إيضا مراجعة هذا البحث من قبل لجان مستقلة في جامعة شيفلد ، المملكة المتحدة و تم الموافقة عليه من دون احداث اي تغييرات على بروتوكول البحث.

15. لطلب اية معلومات إضافية يرجى الاتصال بالباحث في المملكة الأردنية الهاشمية

السيد ثامر احمد عبد الكريم التيم

Thamer Ahmad Altaim, MSc, MCSP, PT
(Musculoskeletal)
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Appendix C: Consent forms for the qualitative study

Participant consent form

Study title:	**Exploring the characteristics of an outcome measurement tool for chronic low back within a Jordanian health care context**
Principal researcher	Thamer Ahmad Altaim
Telephone number	+962 (0) 7 85-818-800

	Please read the following statements and put your initials in the box to show that you have read and understood them and that you agree with them	**Please initial each box**
1	I confirm that I have read and understood the information sheet dated **date** for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
2	I understand that my involvement in this study is voluntary and that I am free to withdraw at any time, without give any reason and without my medical care or legal rights being affected. [Alter this for students or non-patients.]	
3	I understand that relevant sections of my medical notes and data collected during the study may be looked at by responsible individuals from the Sponsor, the Research Ethics Committee and from the NHS Trust, where it is relevant to this research. I give permission for these individuals to have access to my records.	
4	I agree to take part in this study	

To be filled in by the participant

I agree to take part in the above study

Your name	Date	Signature

3

To be filled in by the person obtaining consent

I confirm that I have explained the nature, purposes and possible effects of this research study to the person whose name is printed above.

Name of investigator	Date	Signature

Filing instructions

1 copy to the participant
1 original in the Project or Site file
1 copy in the medical notes (if applicable)

Thank you for your participation on this study, your help is much appreciated.

The University Of Sheffield.

نموذج موافقة للاشتراك في البحث

عنوان الدراسة	استكشاف خصائص اداة قياس مخرجات العلاج لمرضى الم اسفل الظهر في سياق النظام الصحي الأردني
اسم الباحث	ثامر احمد عبدالكريم التيم
رقم الهاتف	+962 (0) 7 85-818-800

اسم المشارك	

	نرجو قراءة البنود التالية؛ إذا كنت موافقاً على البند، يرجى وضع الاحرف الاولى من الاسم في المربع، في حال لم تكن موافقاً على البند يرجى ترك المربع فارغاً والتوقيع بعد ملأ النموذج. من حقك الحصول على نسخة من نموذج الموافقة هذا.	مثال: إذا كان اسمك عامر خالد – يكتب في المربع ع. خ.
اولا	أقر بأني قمت بقراءة وفهم رسالة البحث الصادرة بتاريخ 22 / 11 / 2011، الموضحة لمشروع البحث أعلاه، وأنه تم إتاحة الفرصة لي لقراءة المعلومات و للاستفسار عن موضوع البحث و تم اجابتي بطريقة مرضية.	
ثانيا	أعلم بأن مشاركتي في البحث هو عمل تطوعي، وأنه بإمكاني الانسحاب في أية لحظة دون إعطاء مبرر لذلك ودون وجود عواقب سلبية. كما أعلم أنه لن يتم استخدام اسمي في المواد البحثية، ولن يتم الكشف عن هويتي أو تحديديها في التقرير/ التقارير الناتجة عن البحث.	
ثالثا	أعلم أنه سيتم الاحتفاظ بتشخيصي و ملفي الطبي وكافة المعلومات التي تم جمها عني خلال هذا البحث بسرية تامة. أعطي الإذن للباحث وفريق البحث للاطلاع على معلوماتي.	
رابعا	أوافق على استخدام معلوماتي في أبحاث مستقبلية	
خامسا	أوافق على المشاركة في الموضوع البحثي أعلاه.	

يتم تعبئته من قبل المشارك بالبحث

اوافق على المشاركة بالبحث اعلاه

اسم المشارك بالكامل	التاريخ	التوقيع

The University Of Sheffield.

يتم تعبئته من الشخص الذ قام بالحصول على الموافقة

أؤكد أنني قد شرحت طبيعة و غرض والآثار المحتملة لهذه الدراسة البحثية إلى الشخص صاحب الاسم المطبوع أعلاه.

الاسم بالكامل (الباحث)	التاريخ	التوقيع
ثامر أحمد عبد الكريم التيم		

معلومات التعبئة

بعد أن يتم التوقيع على النموذج من قبل جميع الأطراف، يجب أن يحصل المشترك على نسخة تحوي التاريخ والتواقيع، نسخة من رسالة البحث التي تبين هدف وآلية البحث. كما يجب الاحتفاظ بنسخة من النموذج تحوي التاريخ والتواقيع في ملف خاص بالبحث مع الباحث مع المحافظة على السرية التامة لكافة المعلومات التي سيتم جمعها من المشترك.

شكراً لك جزيلاً على المشاركة في هذه الدراسة، مساعدتكم هي موضع تقديرنا.

Appendix D: Interview topic guideline

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Patient's perspective

Good morning/afternoon Mr/Mrs … Thank you very much for taking part in this study. My name is Thamer Altaim and I am a research student in the faculty of medicine, dentistry and health at the University of Sheffield in the United Kingdom. You are invited to take part in this study because you have low back pain. Please note that this interview will be voice recorded and it will begin shortly after reading the information sheets. This interview may take up to one hour but it is anticipated to last around 20 minutes of your time. Any information or details discussed within this interview will be kept secure and confidential. Any topics discussed will not be shared with anyone except the supervisory team in the United Kingdom for study purposes. All data will be destroyed ten years following the completion of this study.
Can you please start off by telling me, just briefly, about your life?

Symptoms

- How does your low back pain affect you?
- Does it stop you from doing the things you need to? Psychologically? Socially? Mentally?

Patient's perspective

- You have been referred to the physiotherapists. What is your expectation of this?
- What do you want to achieve by attending physiotherapy?
- Do you think that physiotherapy can change ……?
- How would you know that you improved/deteriorate? What this mean to you?

Others

- Have you seen anyone else about your back pain?
- What were your expectations when you saw them?
- Do you have any concerns about your back pain? If so, what are they?

Is there anything else about back pain that you would like to explain to me before we finish up?

Thank you very much for your time, have a nice day.

The University Of Sheffield.

ورقة المريض

صباح الخير/ مساء الخير سيد/ سيدة ..... أود أن ابدأ بشكركم جزيل الشكر على المشاركة في هذه الدراسة. انا اسمي ثامر التيم و انا طالب دراسات عليا في كلية الطب و طب الاسنان و الصحة في جامعة شيفلد في المملكة المتحدة (بريطانيا). تمت دعوتك للمشاركة في هذه الدراسة لإنك تعاني من الم اسفل الظهر. يرجى ملاحظة ان هذه المقابلة سيتم تسجيلها صوتيا و سوف تبدأ قريبا بعد قراءة صفحة المعلومات. هذه المقابلة قد تصل مدتها الى 20 دقيقة من وقتكم و لكنه من المتوقع جداً ان تنتهي قبل ذلك الوقت.
يرجى ملاحظة ان أي معلومات او تفاصيل يتم مناقشتها في المقابلة سوف يتم التعامل معها و حفظها بسرية تامة. يرجى ملاحظة ان أي مواضيع يتم مناقشتها لن يتم مشاركتها او كشفها لأي أحد - الا لطاقم البحث في المملكة المتحدة لغايات الدراسة فقط. يرجى ملاحظة ان جميع البيانات سوف يتم تدميرها بعد عشر سنوات من اتمام هذه الدراسة.

هل من الممكن ،لو سمحت، أن تبدأ بإخباري بشكل موجز عن حياتك بشكل عام؟ شو طبيعة شغلك؟ كيف بدأ المرض معك؟
ما هي الاشياء التي تزيد من الالم؟ ما هي الاشياء التي تقلل الالم؟

الأعراض

- كيف يمكن لالم اسفل الظهر ان يؤثر عليك؟
- هل يوقفك الم اسفل الظهر من القيام بالأشياء التي تود القيام بها؟ نفسيا؟ مجتمعيا؟ عقلياً؟

وجهة نظر المريض

- لقد تم تحويلك الى العلاج الطبيعي. ما هي تطلعاتك/توقعاتك من هذا؟
- ما الذي تطمح ان تحققه من القدوم الى العلاج الطبيعي؟ (استخدام خدمات العلاج الطبيعي)
- هل تتوقع ان العلاج الطبيعي سوف يغير .....؟ (الأفكار التي طرحها المريض)
- كيف يمكن لك من معرفة ما إذا كنت تتحسن/ تسوء؟ ماذا يعني هذا لك؟

أخرى

- هل راجعت احد اخر في ما يتعلق بالم اسفل الظهر؟
- ما كانت توقعاتك عندما قمت بمقابلتهم؟
- هل لديك أية مخاوف في ما يتعلق بالم اسفل الظهر؟ و اذا كان لديك، ما هي تلك المخاوف؟

هل لديك اي أشياء اخرى تتعلق بالم اسفل الظهر تود ان تتحدث عنها الي قبل أن ننهي هذه المقابلة؟

شكراً لك جزيل الشكر على إعطائنا شئ من وقتك ، نتمنا لك نهار سعيد.

Appendix E: A summary of the qualifications of the translators and few examples of translation validation

Name	Research background	Familiar with the requirements of translation	Translation phase
Thamer Altaim	Musculoskeletal physiotherapists, (MSc)	Yes, used the translation guidelines in previous research	1,2,3 and 4
Nancy Ali	Musculoskeletal physiotherapists, (MSc)	Yes, she was involved in cross-cultural adaptation studies	1, 2 and 4
Dr Rasha Okasheh	Cardiopulmonary physiotherapist, (PhD)	Yes, she was involved in cross-cultural adaptation studies	3 and 4
Dr Jennifer Muhaidat	Musculoskeletal physiotherapists, (MSc)	Yes, but she does not have any previous experience	3 and 4

Table 1: Functions

ID	Lying down	Get out of bed	Sitting	Standing	Trunk movements	Squatting	Walking	Lifting weights	Qualities of Mov.
LBP-28 (3)	---------------	---------------	تقعد على الكرسي بتقعد باعتدال ... مش زي أول (20)	لمى أربح و أقعد ... شايف كيف و تطول القعدة و بدي أقوم ... بحس انو ما بقدرش اوقف (30)	بدي أطمن أطول شغلة مثلاً (20) مش زي أول ألف يمين و شمال (20)	---------------	هذا بيكوبح رجليك ... بيصير تقدرش تمشي تقدرش تطلع (10) يعني انا بمشي صحيح و بروح و باجي ... شايف كيف ... بس مش زي أول (20)	---------------	بس لمى أقعد في الدار و بريح ... اه ... وبعديها بدك تقوم هيك فجئة ... بتلاقي رجليك متشنجات ... بس بعد ما أمشي و أتلين ... بيخف ... بيخف كثير (30)
LBP-28 (3)	---------------	---------------	"you know when one sits down on a chair with straight back, I can't sit the way I used to"20	" I can't stand up directly after sitting down for a long period of time."30	"when I bend over to lift something from the ground" 20 " I can't turn my trunk around to the right or to the left"20	---------------	This (LBP) will limit your abilities to use your legs, you can't walk or move around"10 "it is true that I can walk and get things done but not like I used to"20	---------------	"I can't stand up quickly if I am lying or sitting down at home, you feel as there is a spasm in your leg. However, this will go away when I start to move around" 30

Table2: Psychology

ID	Depression	Nervousness	Hopeless	Anxiety	Fear of movement	Anger	Others
LBP-02 (4)	اه فعلاً صابني بالاحباط و العصبية وصابني باكتئاب ... و حسسني دائما انو انا عندي عجز ... يعني بحاول اني اتلاشى العجز الي انا بحس فيه لكن بنفس الوقت انو انا مش قادر انساه من دماغي ...(12)	اه فعلاً صابني بالاحباط و العصبية وصابني بإكتئاب ... و حسسني دائما انو انا عندي عجز ... يعني بحاول اني اتلاشى العجز الي انا بحس فيه لكن بنفس الوقت انو انا مش قادر انساه من دماغي ...(12)	اه فعلاً صابني بالاحباط و العصبية وصابني بإكتئاب ... و حسسني دائما انو انا عندي عجز ... يعني بحاول اني اتلاشى العجز الي انا بحس فيه لكن بنفس الوقت انو انا مش قادر انساه من دماغي ...(12)	يعني انا ما احملها كاملة ... انو انا اظل ... يعني لو حملتها بعرف انو هذيك الليلة انسى النوم ... (26) انو الانسان بيحس حالو فجئة بطل انو قادر لا يقوم و لا يقعد ... يعني انو بصيبه شلل ... او بصيبه كسر في العمود الفقري ... او هشاشة في العظم مرة وحدى ... بدون ما هو يكون دكتوره منبهو لهيك اشي ...(32)	لا هو تشيل اوزان لا ... هو اي مريض ديسك دائماً بيحاول انو يتجنب انو يشيل ... لكن لمنو بيفرض عليه انو لازم يشيل هالشي بدو يشيلو لانو عارف انو ما في بديل انو يشيله عنو (26).	بيصير متوفزني ... يعني بحاول اني حتى لو بدي أوخذ مسكنات ... يعني انا من سنة و نصف لغيت المسكنات ... لاني حسيت انو انا صالي بوخذ بشي بيخدرني لكن في النهاية الالم موجود (14).	---------------
LBP-02 (4)	"Yeah sure, this problem makes me feel hopeless, anxious and depressed. I always feel as I have permanent disability. I try to overcome this disability which I am suffering from at the moment. However, I can't forget it"12	"Yeah sure, this problem makes me feel hopeless, anxious and depressed. I always feel as I have permanent disability. I try to overcome this disability which I am suffering from at the moment. However, I can't forget it"12	"Yeah sure, this problem makes me feel hopeless, anxious and depressed. I always feel as I have permanent disability. I try to overcome this disability which I am suffering from at the moment. However, I can't forget it"12	"I don't lift things completely, I mean I know if I left it; I will not sleep that night"26 "I am afraid that over a sudden I will not be able to move, stand up or sit down … I mean that I suffer disability, osteoporosis or a fracture in the spinal column without warning. I mean your doctor should warn you about this problem"32	"I don't lift heavy weights. People who suffer from disc problem avoid lifting heavy objects"26	"This pain annoys me. I tried to stop taking these analgesics because I believe that these analgesics is masking the problem and the pain is still there"14	---------------

Table 3: Social life

	Impact			Limitation	
ID	Home	Work	Interaction with people	Loneliness	Dependence
LBP-02 (4)	"This problem has an impact on my life, on my work, on my relationship with my wife. It (LBP) affects many things on my life. I mean this pain affects my private (sex) life"8 "I used to teach my children and look after them for long hours, I can't tolerate sitting down for a long period of time because of this pain in the lower back. I become nervous very quickly. I want to finish as quickly as possible. I try to forget this problem but I can't because at that time I feel severe pain"10	---------------	"I am the one who is interacting with other people in a different way, not them"16	"Some time the pain severity makes you nervous and you can't tolerate anything. You don't like anyone to talk to you. You ask people to leave you alone not to express your nervousness in front of them"28	"I notice that when I try to lift something heavy, my children don't let me carry it. They help me. My husband ask me not to lift something because it will affect me"18
LBP-35 (24)	Even if I am in pain I cannot show it in front of people, but I have my husband at home…that's all (28) I know that too much load can affect you (32)	I cannot do my housework on numerous occasions (6)	---------------	---------------	There are so many things like washing or rinsing…I think to myself, I need one of my children to come and help me (30)

Commented [F2]: Maybe immediately? But he/she is talking about a feeling or a perception so I think you need to incorporate that into the translation?

Commented [F1]: Not sure if this is accurate it seems to me that the subject is saying that he can sit straight??

Commented [F3]: Go out?

Commented [F4]: I think it would be nice if you would use some of his words such as once I warm up the pain becomes less much less

Commented [F6]: Did you not continue for a reason?

Commented [F7]: It is important in my opinion to say that she stopped using the meds

Commented [F5]: Not afraid she feels that all of a sudden she is not able to stand or sit

Commented [F8]: Remove other

Commented [F9]: What about the walking bit?

Commented [F10]: I think she means cleaning the floor?

Table 4: Understanding

ID	Cause	Consequences	Source of the information	The nature of the problem	Management
LBP-21 (14)	بيحب يلعب فطبول و يحب يقعد على الكمبيوتر كتير بيحب يسوق كتير ... هاي الاشياء الي بتوقع سيدو الي الالم ... بالظهر ... يمكن انا عشان اكبر واحد في العائلة ... يمكن في علية مسؤلية كتير و ضغط كتير بروح وباجي كتير (2(	ابطل اسيطر على اعصابي ... ابطل اسيطر على اشي ... ابطل اعوف امشي (44(هو في مرحلة اكيد ما حد بيحب يوصل الها ... الي هي يبطل بسيطر على اعصابه يبطل بسيطر على مشيه ... يبطل بسيطر على الول ... يبطل بسيطر على الدراز (46(	رحت عند دكاترة ... على مستشفيات خاصة يعني ... و هيك ... سويت صورة اشعة عادية ... بيحكولي ما في اشي ... شد عضل ... ما في اشي شد عضل ... اخر اشي ... قد ما رحت واجعت عند دكتور ... قالي خلص روح صورلي رنين يعني ... انت بنعاني من مشكلة احنا مش عارفين شو هي (6(قو اجمت الدكاترة و رحت تصورت صورة ثانية ... بيحكولي انو الديسك كتير ان عندك (8(	لمى سويت رنين ... بين عندي ديسك ... فقرة رابعة خامسة ... الخامسة اسفل ... عجزية او قطنية ... قطنية (6(في اشي تحرك من مكانه في ظهري يعني العلاج الطبيعي اكيد ما راح يرجعو ... بس انو تخفيف الم يعني ... اه ... تخفيف الم ok(حسيت فيو ... حسيت في فرق (40(	في اشياء تلبة دورت عليها وسمعتها ... انهم بيحطو الجسم ... يعني بيسحبو الواحد بأجهزة معينة ... بيقام عليها قنترة طويلة ... بيصير الاشياء ترخي ... العمود الفقري برخي و بحاولو يرجعو الانزلاق مكانه (40(
LBP-21 (14)	"Playing football, sitting down on a computer for a long time and driving are what caused me this pain. Maybe because I am the oldest son and there is a great responsibilities and stress"2	"That I lose control of my nerves, lose control of everything. I am afraid that I will not be able to walk."44 "I don't want to reach to a state when I lose control of my nerves, I can't walk, control bowel or bladder"46	"I went to see many doctors in many hospitals. I took many x-ray pictures; they told me nothing wrong … it is a muscle spasm. I went to see another doctor who asked me to do MRI"6 "I went to see doctors again and I showed them recent pictures (of his back). They told me that the disc problem is increasing"8	"I did MRI and it shows that I have a problem in the fourth, fifths and firs sacral vertebras"6 "Something moved in the lower back and physiotherapy will not help me to get it back again. I think it will help me to decrease pain"40	"There are other things that I heard about like decompression machine. These will do some sort of traction when you sleep on it and with time your tissues will loosen up. Then they will try to get the disc back to its place"40

Table 5: Vigilance

ID	Preventing further deterioration	Do it right	Thinking before doing	Hiding the problem
LBP-22 (17)	"Sometimes I force myself to do work. However, recently I stopped doing this because I notice that my pain has increased"30	----------	"I think about these heavy objects before moving them around or lifting them"28	"Sometimes I believe that this is an internal problem and people should not know about it"24 "Only my family knows about my problem. To other people I look normal, I sit down and talk to people as a normal person without showing them any problems"26
LBP-35 (24)	----------	"When I want to get out of bed, I sit down then I stand up. I mean gradually"8	----------	"I can't show other people my problem even if I am in pain"28
LBP-14 (38)	"Sex may further deteriorate your problem"18	"We do things without thinking. Anyone should do things in the right way. He should think before doing it"44	"I will think about many things before taking any action"22 "I think how I will lift it before lifting it"44	----------

Table 6: Spiritual

LBP-9 (25)	No, this does not affect me at all…it is God's will…(14) We are asking our Lord to be treated…then the movement will be better… the health status… and then we will have less pain…(24)	----------
LBP-11 (31)	----------	Praise is to Allah, the Lord of the worlds… the believes have a psychological effect on the person…(30) Most of the diseases are due to the mental status and illusions…and because of that I'm convinced that I will be treated… by the God's will of course…(30) I have a full conviction in believing in God and that he will give me what I want, afterwards I will die…(42)

Table 7: Cope with pain

ID	Cope with pain
LBP-29 (6)	(عانيت من شهر ... لشهر و نصف ... بعد هيك بلشت ... انى استوعب هاي الامور و أستوعب ... و بلشت انها تخف ... لا ... تنسى تو مع نمط حياتي اشي طبيعي يعني عادي ...صرت اتكيف 4)
LBP-29 (6)	(في اولها ... اه ... و بعدين يعني بعد ما اتكيفت ... و بفترة ... حتى لو المني ظهري ... بتحملو 6)
LBP-29 (6)	"I stuffered for one month or one month and a half then I realized and understood that it [pain] is decreased. Don't forget that this is [experiencing pain] is something normal with my life style. I adapted to this"4 "a while after I adapted myself and later on I tolerated it [continue my work] even if my back is in pain"6

Table 8: How you can judge if you are improving or not?

ID	Restoring function	Pain reduction	Improvements within the Psychological state
LBP-17 (2)	بكون مرتاحة بكون ما عم بشكي من ظهري ... ما عم بوجعني ... بقدر اتحرك بارتحية (26(	كلم ... كلم ... والله انا اليوم مرتاحة كانو ما عندي شي .. كانو رجعت زي زمان (28(	----------
LBP-17 (2)	"I will not be complaining about my back. I will not feel pain and I will be able to move around without restrictions"26	"I will not feel that pain as I got nothing. I feel it as I return back to normal"28	----------

Commented [F11]: did he mention it in this context? Should or tha

Commented [F12]: t they actually don't know?

Commented [F13]: Can't or don't?

Commented [F14]: Talking about lifting

Commented [F15]: And that the movement will become better

Commented [F16]: I think he/she means that they ask ALLAH to grant them what they want and then if they die it's no problem?

Commented [F18]: Will??

Commented [F17]: I will???

Appendix F: Ethics approval from Sheffield Hallam University

centre for health and social care research

22 November 2011

Thamer Altaim
Sheffield Hallam University
Health & Social Care Research
Mundella House
34 Collegiate Crescent
Sheffield
S10 2BP

Dear Thamer

This letter relates to your research proposal
TITLE: **Lower Back Pain Project**

This proposal was submitted to the Faculty Research Ethics Committee for ethics and scientific review. It has been reviewed by two independent reviewers and has been passed as satisfactory. The comments of the reviewers are enclosed. You will need to ensure you have all other necessary permission in place before proceeding, for example, from the Research Governance office of any sites outside the University where your research will take place. This letter can be used as evidence that the proposal has been reviewed ethically and scientifically within Sheffield Hallam University.

Good luck with your project.

Yours Sincerely

P Allmark

Peter Allmark
Chair Faculty Research Ethics Committee
Faculty of Health and Well-being
Sheffield Hallam University
32 Collegiate Crescent
S10 2BP

0114 225 5727
p.allmark@shu.ac.uk

Appendix G: Ethics approval from King Abdullah University Hospital

مستشفى الملك المؤسس عبدالله الجامعي
King Abdullah University Hospital

مكتب المدير العام
General Director Office

هاتف: ٧٢٠٠٦٠٠ (٢-٩٦٢) فاكس: ٧٠٩٥٧٧٧ (٢-٩٦٢)

ص.ب (٦٣٠٠٠١) اربد (٢٢١١٠) الأردن

Ref. 16/2/5/3294
Date: 19-9-2012

الرقم :
التاريخ : هـ
الموافق : م

D.r Sue Mawson,

School of Health and Related Research
Regent Court
30 Regent Street
Sheffield S1 4DA
Tel: 01142228270
Email: s.mawson@sheffield .ac.uk

Dear Dr.

In reference to your letter, in which you confirmed that Mr. Thamer Altaim is a PhD student at the Faculty of Medicine, Dentistry and Health, School of Health and Related Research (ScHARR) at the University of Sheffield and will be undertaking a project entitled:

" To develop a culturally sensitive clinical outcome measurement tool for individuals receiving physiotherapy management for chronic low back pain in Jordan "

We would like to inform you that the IRB Committee has granted Mr. Thamer Altaim the approval to conduct his proposal at King Abdullah University Hospital for the purpose mentioned above, under the following conditions:

1. Confidentiality is required while collecting data.
2. Informed consent is required to be kept in the medical record.
3. Provide us with a final report including patient's names.
4. Provide us with the results of the research before publishing.

Sincerely,,,

Prof. Hussein Heis

CEO KAUH

Tel.: (962-2) 7200600 Fax: (962-2) 7095777 P.O.Box: (630001) Irbid (22110) Jordan Email: kauh@just.edu.jo

Appendix H: Ethics approval from the Ministry of Health in Jordan

SATO

مكتب سكينة للترجمة المعتمدة

SUKAINA AUTHORIZED TRANSLATION OFFICE

(TRANSLATION FROM ARABIC)
IN THE NAME OF ALLAH MOST GRACIOUS MOST MERCIFUL

THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF HEALTH

The Hashemite Kingdom of Jordan, Tel. +962-6-5200230, Fax +962-6-5688373,
P.O.Box 86, Amman 11118 – Jordan, Website: www.moh.gov.jo

No. : Development/Trainees/10075
Date : ..... H.
Corr. to : 17.10.2012 G.

Director of Al-Bashir Hospital
Director of Al-Karak Hospital
Director of Dr. Jamil Totanji Hospital/ Sahab

Dear Sirs,

Please find attached a copy of the letter of Head of Academic Research Ethics Committee No. M.B.A./Ethics Committee/9912 dated 15.10.2012, re the approval of the Ph.D. student of Physiotherapy/ ***Thamer Ahmad Abdul Kareem Altaim*** from the University of Sheffield/ Britain to perform a research entitled:

(EXPLORING THE CHARACTERISTICS OF AN OUTCOME MEASUREMENT TOOL FOR CHRONIC LOW BACK PAIN WITHIN THE JORDANIAN HEALTH CARE CONTEXT)

through making meetings with the low back pain patients and physiotherapists at the your hospital;

You are kindly requested to give your instructions to facilitate the mission of the above mentioned researcher.

With kind regards.

I, the undersigned, hereby certify that I am conversant in Arabic and English languages, and that the above translation made by me is, to the best of my knowledge and belief, a correct translation of this document, from Arabic into English.

المملكة الأردنية الهاشمية
وزارة الصحة
The Hashemite Kingdom of Jordan
Ministry of Health

For/ Director of Human Resources Development Dept.
Dr. Fadwa Al-Shawabkeh
(Signed)

وزارة الصحة – المملكة الأردنية الهاشمية – THE HASHEMITE KINGDOM OF JORDAN – MINISTRY OF HEALTH

Certified Translation
03 MAR 2014
Signature

SATO Tel.: 5690077 – SUKAINA AUTHORIZED TRANSLATION OFFICE – مكتب سكينة للترجمة المعتمدة

Amman, Jabal Al-Hussein, (220) Sukaina Bldg.
Ground Fl. Tel. 5699077 (3 Lines) - Fax (962-6) 5606552
e-mail: sato@satotranslation.com

عمان - جبل الحسين - (٢٢٠) مجمع سكينة التجاري - الطابق الأرضي
المدخل الغربي - هاتف: ٥٦٩٩٠٧٧ (٣ خطوط) - فاكس: ٥٦٠٦٥٥٢ (٦-٩٦٢)

HLTH-CER.ThamerTaim20.doc-3.3.2014

(TRANSLATION FROM ARABIC)
IN THE NAME OF ALLAH MOST GRACIOUS MOST MERCIFUL

THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF HEALTH

The Hashemite Kingdom of Jordan, Tel. +962-6-5200230, Fax +962-6-5688373,
P.O.Box 86, Amman 11118 – Jordan, Website: www.moh.gov.jo

No. : M.B.A./Ethics Committee/9912
Date : ..... H.
Corr. to : 15.10.2012 G.

Director of Human Resources Development

Dear Sirs,

With reference to your letter No.: Development/Trainees/9166 dated 06.09.2012 re the research submitted by the Ph.D. student/ ***Thamer Ahmad Abdul Kareem Altaim*** entitled:

(EXPLORING THE CHARACTERISTICS OF AN OUTCOME MEASUREMENT TOOL FOR CHRONIC LOW BACK PAIN WITHIN THE JORDANIAN HEALTH CARE CONTEXT)

Please be informed that the above mentioned research has been presented to the Academic Research Ethics Committee, and the Committee has decided to approve performing this research.

For your kind review and for your actions, please.

With kind regards.

Director of Al-Bashir Hospital
Dr. Issam Al-Shraideh
(Signed)

I, the undersigned, hereby certify that I am conversant in Arabic and English languages, and that the above translation made by me is, to the best of my knowledge and belief, a correct translation of this document from Arabic into English.

(Stamp of Human Resources Development Dept./ Ministry of Health)

وزارة الصحة
المملكة الأردنية الهاشمية
THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF HEALTH

SATO
مكتب سكينة للترجمة المعتمدة
Tel.: 5690077
SUKAINA AUTHORIZED TRANSLATION OFFICE

Certified Translation
04 MAR 2014
Signature

المملكة الأردنية الهاشمية
وزارة الصحة
The Hashemite Kingdom of Jordan
Ministry of Health

Appendix I: The first draft of the TELER LBP indicators

Generic indicators

1- General function (not hierarchical)

- Walk without feeling pain in the lower back
- Stand and sit safely, without feeling pain in the lower back
- Lift object independently, without feeling pain in the lower back
- Sleep undisturbed.
- Managing clothing without feeling pain in the lower back

0. Unable to do any
1. Able to do 1
2. Able to do 2
3. Abel to do 3
4. Able to do 4
5. Able to do all

2- Pain free activity* (from pain prevents)

* Specify in the notes

0. Pain prevents **named activity**
1. Pain interrupts **named activity**, unable to resume
2. Pain interrupts **named activity**, able to resume
3. Pain during **named activity**, able to continue without interruption
4. Pain after completion of **named activity**
5. Pain free throughout **named activity**, no pain after

3- Independent toileting (not hierarchical)

- Maintain sitting
- Sit to stand
- Stepping
- Stand to adjust clothes
- Stand to sit

0. Unable to do any
1. Able to do 1
2. Able to do 2
3. Able to do 3
4. Able to do 4
5. Able to do all

4- Washing independently (not hierarchical)

- Wash hands
- Wash face
- Wash feet
- Wash head
- Wash the hand from the fingers to the elbow

0. Does none independently
1. Does one independently#
2. Does two independently
3. Does three independently
4. Does four independently
5. Does all independently

5- Return to sporting activity

0. Unable to exercise
1. Return to physiotherapy exercises only
2. Return to pre-sport training
3. Return to sporting activity controlled and paced
4. Return to sporting activity, unable to complete
5. Return to full sporting activity - no problems

6- Sciatic referral anaesthesia (x) pain (y) paraesthesia (z)

0. [] in sciatic disturbance to include foot
1. [] in sciatic distribution to lower leg, not beyond
2. [] into buttock and thigh, not beyond
3. [] into buttock, not beyond
4. [] into back
5. [] free

7- Ability to perform functions after the onset of lower back pain

0. Pain (24 hrs)
1. Pain free in lying
2. Pain free in standing or walking
3. Pain free in forward flexion or sitting
4. Pain free in functional activities
5. Pain free in daily activities

Lying in bed

8- Sleep without disruption due to pain

0. Unable to sleep due to pain
1. Wakes up due to pain, unable to go back to sleep
2. Wakes up due to pain, goes back to sleep
3. Pain does not interrupt sleep
4. No pain on going to sleep, pain on waking up
5. Sleep pain free

9- Sleep normally (not hierarchical)

- Difficulty getting off to sleep
- Wakes frequently
- Unable to adopt usual sleep position
- Pain on waking am
- Requires pain killers to sleep

0. All problems present
1. 4 problems present
2. 3 problems present
3. 2 problems present
4. 1 problem present
5. 0 problems present

10- Sleep pain free

0. Unable to sleep due to pain
1. Pain does not prevent but interrupts sleep, unable to go back to sleep
2. Pain does not prevent but interrupts sleep, able to go back to sleep
3. Pain does not prevent and does not interrupt sleep
4. Sleeps pain free but pain on waking
5. Sleeps pain free, no pain on waking

Bed mobility

11- Bed mobility (not hierarchical)

- Able to bend hips and knees
- Able to maintain hips and knees in flexion
- Able to lift bottom
- Able to shift bottom across
- Able to shift shoulders and head Across

0. Unable to achieve any
1. Able to achieve 1
2. Able to achieve 2
3. Able to achieve 3
4. Able to achieve 4
5. Able to achieve all

12- Lying to sitting over edge of bed

0. Cannot move functionally in bed
1. Can achieve crook lying
2. Can achieve modified bridge to move sideways
3. Can role into side lying (with knees bent)
4. Can roll into side lying and achieve forearm support
5. Can achieve sitting on edge of bed (by dropping legs over side and pushing up with arm)

13- Lying to sitting on bed

0. Unable to sit from lying
1. Able to lift and turn head and upper trunk
2. Able to move arm and rotate upper trunk through midline
3. Able to extend supporting arm, rotate lower trunk and lift legs off bed
4. Able to transfer weight onto bottom
5. Able to get to sitting and release arms

Getting out of bed

14- Get out of bed (not hierarchical)

- Sit to stand to get out of bed
- Move forward to edge of bed
- Push up into sitting
- Roll onto side
- Each with arm turn head and bend leg

0. Unable to do any
1. Able to do 1
2. Able to do 2
3. Able to do 3
4. Able to do 4
5. Able to do all

15- Transfer lying to standing pain free

0. Unable to achieve pain free position
1. Able to achieve pain free position in lying with support of one
2. Able to achieve pain free position in lying independently
3. Able to transfer lying to standing pain free
4. Standing pain free
5. Lying to standing pain free

Sitting to standing

16- Sitting to standing

0. Unable
1. Able to move forwards on chair or bed
2. Able to transfer weight over feet
3. Able to lift bottom off chair or bed
4. Able to extend knees, hips or trunk
5. Able to extend knees, hips and trunk

17- Stand to sit

0. Sits down with no control
1. Brings weight forwards, from standing position
2. Bends hips and knees
3. Hands reach to chair arms
4. Lowers smoothly onto chair
5. Moves hips to back of chair to adjust sitting posture

18- Floor sitting to standing

0. Unable to transfer weight in side sitting
1. Able to transfer weight in side sitting
2. Able to transfer weight forwards over knees
3. Able to extend hips into high kneeling and place non weight bearing foot on the floor
4. Able to transfer weight onto foot and extend hip and knee
5. Able to stand

Maintaining sitting

19- Sit pain free

0. Unable to sit due to pain
1. Pain interrupts sitting for (Specify time), unable to continue
2. Pain interrupts sitting for (Specify time) but able to continue
3. Able to sit pain free for (Specify time) but pain afterwards
4. Able to sit pain free for (Specify time) but discomfort afterwards
5. Able to sit for (Specify time) without discomfort

Maintaining standing

20- Stand pain free

0. Unable to stand for (Specify time) due to pain
1. Pain interrupts standing for (Specify time), unable to continue
2. Pain interrupts standing for (Specify time) but able to continue
3. Able to stand pain free but pain afterwards
4. Able to stand for (Specify time) pain free but discomfort afterwards
5. Able to stand for (Specify time) without discomfort

Standing to bending forward

21- Trunk movement pain free

0. Unable to bend the trunk forward because of pain
1. Pain when initiating bending, pain free at standing
2. Pain when trunk flexed, but not fully
3. No pain when trunk flexed, but not fully
4. Pain when trunk fully flexed
5. Full active range of trunk movement forward, pain free

Standing into squatting

22- Standing to squatting

0. Able to bend head forward
1. Able to bend the trunk forward
2. Able to bend hip
3. Able to bend knees
4. Able to bend ankles
5. Able to maintain a squatting position independently

23- Squatting into standing

0. No extension possible in knees and hip
1. Knees extended
2. Hips extended
3. Trunk extension lumbar lordosis
4. Trunk extension - upper trunk in alignment
5. Head in neutral flexion or extension

Walking

24- Walk a distance outdoors

0. Unable to walk to door without feeling pain (during or after)
1. Able to walk to inside room without feeling pain
2. Able to walk to toilet without feeling pain
3. Able to walk length of corridor without feeling pain
4. Able to walk all necessary distances indoors, pain free
5. Able to walk all necessary distances outdoors, pain free

25- Walking without pain in the lower back

0. Unable to initiate sitting to standing in preparation for walking due to pain in the lower back
1. Able to initiate sitting to standing in preparation for walking but unable to walk due to pain in the lower back
2. Pain in the lower back interrupts walking and cannot resume
3. Pain in the lower back interrupts walking but can resume
4. Able to walk with no interruption, with the presence of pain in the lower back
5. Able to walk, without pain in the lower back

26- Walk independently (not hierarchial)

- Walk forwards
- Walk backwards
- Walk sideways
- Walk in circle
- Walk around obstacles

0. Unable to achieve any
1. Able to achieve 1
2. Able to achieve 2
3. Able to achieve 3
4. Able to achieve 4
5. Able to achieve all

27- Walk independently with normal gait (from unable to walk - flexed hip and knees)

0. Unable to walk
1. Walks with flexed hip and knees and support from 2 people
2. Walks with flexed hip and knees and support from 1people
3. Walks with flexed hip or knees, stick and helper present
4. Walks with trunk almost straight, alone
5. Walks with normal gait independently

28- Functional walking (not hierarchial)

- Walk in different directions
- Change directions
- Walk on different everyday surfaces
- Able to negotiate slopes
- Able to negotiate confined spaces

0. Unable to do 1
1. Able to do 1
2. Able to do 2
3. Able to do 3
4. Able to do 4
5. Able to do all

Running

29- Run in one direction on even ground without pain or limp or leg tiring*

* Specify in the notes the agreed distance

0. Unable to jog or run in one direction on even ground
1. Able to jog or run in one direction on even ground with severe painful limp
2. Able to jog or run in one direction on even ground with severe limp but no pain
3. Able to run in one direction on even ground with slight limp and no pain
4. Able to run in one direction on even ground without limp or pain but leg tires
5. Able to run in one direction on even ground without pain or limp or leg tiring

30- Run on uneven ground, change direction and pace with no problems afterwards*

* Specify in the notes the agreed distance

0. Able to run at a consistent pace in one direction on even ground
1. Able to run on even ground and change pace but has difficulty changing direction
2. Able to run on even ground, change pace and change direction but has difficulty afterwards
3. Able to run on even ground, change pace and direction with problems afterwards
4. Able to run on even ground, change pace and direction with no problems afterwards
5. Ability to run on uneven ground, change direction and pace with no problems afterwards

31- Jog pain free

* Specify in the notes

0. Unable to walk the required distance* without pain
1. Able to walk the required distance without pain
2. Able to jog the required distance without pain
3. Able to change the pace of jogging without pain
4. Able to change the direction of jogging without pain
5. Able to jog the required distance pain free

Going up stairs

32- Climb stairs pain free

0. Pain prevents climbing stairs
1. Pain prevents climbing stairs but can walk on flat pain free
2. Pain interrupts climbing stairs and cannot resume without support
3. Pain interrupts climbing stairs but can resume without support
4. Pain during climbing stairs but can complete without interruption
5. Pain free during climbing stairs

33- Ascends stairs

0. Unable to place foot on step
1. Able to transfer weight onto 1 foot, maintain hip and knee alignment and place non weight bearing foot on step
2. Able to transfer weight onto placed foot placed on step
3. Able to extend weight bearing hip and knee
4. Able to flex non weight bearing hip and knee
5. Able to place other foot on step

34- Use stairs pain free

0. Unable to weight bear pain free
1. Able to weight bear pain free
2. Pain inhibits going up and down stairs
3. Pain inhibits going up stairs but does not inhibit going down stairs
4. Pain does not inhibit going up stairs
5. Pain free up and down stairs

35- Descend stairs

0. Unable to place foot on lower step
1. Able to place foot and transfer weight onto 1 leg
2. Able to place non weight bearing foot onto lower step
3. Able to transfer weight onto foot placed on lower step
4. Able to flex hip, knee and ankle of rear leg
5. Able to place other foot onto lower step

Lifting

36- Lift weight

0. Unable to bend trunk due to pain
1. Able to bend trunk without pain
2. Able to lift 1 KG without pain
3. Able to lift 2.5 KG without pain
4. Able to lift 5 KG without pain
5. Able to lift **X** KG without pain

Appendix J: The translated version of the first draft of the TELER LBP indicators

مؤشرات عامة لمستويات الحركة عند مرضى الم أسفل الظهر

1- مؤشر حركة عام (غير تصاعدي)

- المشي من غير الاحساس بألم في أسفل الظهر
- الوقوف والجلوس بشكل أمن من غير الشعور بألم في أسفل الظهر
- حمل الأوزان بشكل مستقل من غير الشعور بألم في أسفل الظهر
- النوم من غير إزعاج*
- التحكم بلبس الملابس** من غير الشعور بألم في أسفل الظهر

0 غير قادر على عمل أي منهم
1 قادر على عمل واحدة
2 قادر على عمل اثنتين
3 قادر على عمل ثلاث
4 قادر على عمل أربعة
5 قادر على عملهم كلهم

* النوم بشكل سلس وغير متقطع بسبب الشعور بألم أسفل الظهر او الشعور بهذا االلم عند التقلب في النوم
** القدرة على لبس المعطف او الثوب او القميص او الجرابات القصيرة او الطويلة

2- القيام بنشاط* من غير الشعور بالألم في أسفل الظهر

* يتم تحديده في صفحة الملاحظات
0 الالم يمنع القيام ب **النشاط المسمى**
1 الالم يقاطع **النشاط المسمى** مع غير المقدرة على المتابعة
2 الالم يقاطع **النشاط المسمى** مع المقدرة على المتابعة
3 الشعور بالألم خلال **النشاط المسمى** مع المقدرة على المتابعة من غير مقاطعة
4 الشعور بالألم من بعد أكمال **النشاط المسمى**
5 عدم الشعور بالألم خلال **النشاط المسمى**، مع عدم الشعور بالألم لاحقاً

3- استخدام دورة المياه بشكل مستقل

- المحافظة على الجلوس*
- الوقوف من الجلوس
- المتابعة
- الوقوف لضبط الملابس
- الجلوس من الوقوف

0 غير قادر على عمل أي منهم
1 قادر على عمل واحدة
2 قادر على عمل اثنتين
3 قادر على عمل ثلاث
4 قادر على عمل أربعة
5 قادر على عملهم كلهم

يرجى مراعاة ان هنالك نوعين من المراحيض، العربي والافرنجي (يتم تحديده في الملاحظات).

4- الاغتسال بشكل مستقل

- غسل اليدين
- غسل الوجه
- غسل القدمين
- غسل الرأس
- غسل اليدين من الاصابع الى المرفق

0 غير قادر على عمل أي منهم
1 قادر على عمل واحدة
2 قادر على عمل اثنتين
3 قادر على عمل ثلاث
4 قادر على عمل أربعة
5 قادر على عملهم كلهم

5- العودة للنشاط الرياضي

0 غير قادر على التمرين
1 العودة الى تمارين العلاج الطبيعي فقط
2 العودة الى التدريبات التحضيرية للرياضة
3 العودة الى النشاطات الرياضية بخطى محسوبة* ومتحكم بها**
4 العودة الى النشاط الرياضي ولكن مع غير القدرة على الاستكمال
5 العودة الى النشاط الرياضي، من غير مشاكل

6- امتداد عرق النساء، الخدران (x) الالم (y) تنميل (z)

0 [ ] في اضطراب عرق النساء ليشمل القدم
1 [ ] في امتداد عرق النساء لأسفل الرجل، و ليس ما بعد
2 [ ] في المؤخرة و الفخذ ، و ليس ما بعد
3 [ ] في المؤخرة ، و ليس ما بعد
4 [ ] في الظهر
5 [ ] ليس هنالك

7- القدرة على القيام بالوظائف بعد حصول الم أسفل الظهر

0 الم متواصل (24 ساعة).
1 الاستلقاء من غير الم
2 الجلوس والوقوف من غير الم
3 المشي من غير الم
4 ثني الجذع الى الامام من غير ألم
5 ممارسة النشاطات الحياتية* من غير ألم
* تشمل صعود الدرج وحمل الاشياء

الاستلقاء في السرير

8- النوم من غير مقاطعة بسبب الالم

0 غير قادر على النوم بسبب الالم
1 استيقاظ من النوم بسبب الالم، غير قادر على العودة الى النوم
2 استيقاظ من النوم بسبب الالم، ولكن أعود للنوم
3 الالم لا يقاطع النوم
4 ليس هنالك الم عند الخلود للنوم ولكن الالم عند الاستيقاظ
5 نوم من غير الم

9- النوم بشكل عادي

- صعوبة في الخلود للنوم
- الاستيقاظ بشكل متكرر
- عدم المقدرة على أخذ وضعية النوم الاعتيادية
- الم عند الاستيقاظ في الصباح
- ضرورة أخذ مسكنات الالم للخلود للنوم

0 كل هذه المشاكل موجودة
1 وجود أربعة مشاكل
2 وجود ثلاثة مشاكل
3 وجود مشكلتين
4 وجود مشكلة واحدة
5 لا يوجد أي من هذه المشاكل

الوقوف من الجلوس

16- الوقوف من الجلوس
0 غير قادر
1 قادر على التحرك للأمام من فوق الكرسي أو السرير
2 قادر على نقل الوزن فوق الاقدام
3 المقدرة على رفع المؤخرة من على الكرسي او السرير
4 المقدرة على فرد أي من الحوض أو الركبتين أو الجذع.
5 المقدرة على فرد الحوض والركبتين والجذع

17- الجلوس من الوقوف
0 استطاعة الجلوس ولكن من غير تحكم
1 احضار وزن الجسم الى الأمام من وضعية الوقوف
2 ثني الحوض والركبتين
3 وضع اليدين على الكرسي
4 إنزال الجسم بشكل سلس الى الكرسي
5 تحريك الحوض الى ظهر الكرسي لأخذ وضعية الجلوس

18- الوقوف من وضعية الجلوس على الأرض
0 عدم المقدرة على نقل الوزن بوضعية الجلوس الجانبي.
1 قادر على نقل وزن الجسم الى وضعية الجلوس الجانبي
2 قادر على تحريك الوزن الى الأمام فوق الركبتين
3 قادر على فرد الحوض الى الاعلى لأخذ وضعية الوقوف على الركب ومن ثم تحريك القدم غير محملة الوزن على الأرض
4 المقدرة على تحميل الوزن على القدم وفرد الحوض والركبة
5 القدرة على الوقوف

المحافظة على وضعية الجلوس

19- الجلوس بدون ألم
0 غير قادر على الجلوس بسبب الألم
1 الالم يقاطع الجلوس لمدة (تحديد المدة الزمنية)، غير قادر على المتابعة
2 الالم يقاطع الجلوس لمدة (تحديد المدة الزمنية) ولكنني قادر على المواصلة
3 قادر على الجلوس من غير ألم لمدة (تحديد المدة الزمنية) ولكن هنالك ألم يكون لاحقاً
4 قادر على الجلوس من غير ألم لمدة (تحديد المدة الزمنية) ولكن هنالك عدم ارتياح يكون لاحقاً
5 قادر على الجلوس لمدة (تحديد المدة الزمنية) من غير عدم الارتياح

المحافظة على وضعية الوقوف

20- الوقوف بدون ألم
0 غير قادر على الوقوف بسبب الألم
1 الالم يقاطع الوقوف لمدة (تحديد المدة الزمنية)، غير قادر على المتابعة
2 الالم يقاطع الوقوف لمدة (تحديد المدة الزمنية) ولكنني قادر على المواصلة
3 قادر على الوقوف من غير ألم لمدة (تحديد المدة الزمنية) ولكن هنالك ألم يكون لاحقاً
4 قادر على الوقوف من غير ألم لمدة (تحديد المدة الزمنية) ولكن هنالك عدم ارتياح يكون لاحقاً
5 قادر على الوقوف لمدة (تحديد المدة الزمنية) من غير عدم الارتياح

الانحناء للأمام من وضعية الوقوف

21- تحريك الجذع من غير الشعور بالألم
0 غير قادر على ثني الجذع للأمام بسبب الألم
1 الالم يكون عند البدء بثني الجذع ولكن ليس هنالك ألم في وضعية الوقوف
2 الشعور بالألم عند ثني الجذع، ولكن ليس بشكل كامل
3 ليس هنالك الم عند ثني الجذع ولكن ليس بشكل كامل
4 الشعور بالألم عند ثني الجذع بشكل كامل
5 عدم الشعور بالألم عند ثني الجذع بشكل كامل للأمام

10- النوم من غير الم
0 غير قادر على النوم بسبب الالم
1 الالم لا يمنع ولكنه يقاطع النوم مع عدم المقدرة على العودة للنوم
2 الالم لا يمنع ولكنه يقاطع النوم مع المقدرة على العودة للنوم
3 الالم لا يمنع ولا يقاطع النوم
4 نوم من غير ألم ولكن هنالك الم عند الاستيقاظ
5 نوم من غير الم والاستيقاظ من غير الم

الحركة في السرير

11- الحركة في السرير
- قادر على ثني الحوض والركبتين
- قادر على المحافظة على ثني الحوض والركبتين
- قادر على رفع المؤخرة
- قادر على تحريك المؤخرة للجانب
- قادر على تحريك الكتفين والرأس للجانب

0 غير قادر على عمل أي منهم
1 قادر على عمل واحدة
2 قادر على عمل اثنتين
3 قادر على عمل ثلاث
4 قادر على عمل أربعة
5 قادر على عملهم كلهم

12- النهوض من الاستلقاء الى الجلوس على طرف السرير
0 لا أستطيع اداء وظيفة النهوض من السرير
1 استطاعة ثني الركبتين خلال الاستلقاء
2 استطاعة رفع الجسم كجسر للتحرك الى الجانب
3 استطاعة الدوران الى النوم الى الجانب (مع ثني الركبتين).
4 استطاعة الدوران للنوم على الجانب مع الاستناد على الساعد
5 استطاعة الجلوس على طرف السرير (عن طريق إنزال القدمين الى الجانب ودفع الجسم للأعلى باليد).

13- **النهوض من الاستلقاء للجلوس على السرير**
0 عدم المقدرة على الجلوس من وضعية الاستلقاء
1 المقدرة على رفع وتدوير الرأس والجذع العلوي من الجسم
2 المقدرة على تحريك اليد وتدوير الجزء العلوي من الجذع خلال خط المنتصف
3 القدرة على فرد اليد الدافعة للجسم، تدوير الجزء السفلي من الجذع ورفع القدمين عن السرير
4 القدرة على تحميل الوزن على المؤخرة.
5 القدرة على الجلوس ورفع الايدي عن السرير

الخروج من السرير

14- الخروج من السرير
- الوقوف من حالة الجلوس للخروج من السرير
- التقدم للأمام الى حافة السرير
- رفع الجسم للجلوس
- الدوران للجانب (في السرير)
- تدوير الرأس وثني الرجلين مع تثبيت اليدين

0 غير قادر على عمل أي منهم
1 قادر على عمل واحدة
2 قادر على عمل اثنتين
3 قادر على عمل ثلاث
4 قادر على عمل أربعة
5 قادر على عملهم كلهم

15- تغير الوضعية من الاستلقاء الى الوقوف من دون الم
0 غير قادر على تحقيق الوضعية من غير ألم
1 قادر على تحقيق وضيعة الاستلقاء من غير ألم بمساعدة من أحد
2 قادر على تحقيق وضعية الاستلقاء من غير ألم وبشكل مستقل
3 المقدرة على التنقل بين الاستلقاء والوقوف من غير ألم
4 الوقوف من غير ألم
5 الوقوف من حالة الاستلقاء من غير الشعور بألم

28- أداء وظيفة المشي

- المشي في عدة اتجاهات
- تغيير الاتجاهات
- المشي على الأسطح المختلفة في الحياة اليومية
- قادر على التعامل مع المنحدرات
- قادر على التعامل مع الأماكن الضيقة

0 غير قادر على عمل أي منهم
1 قادر على عمل واحدة
2 قادر على عمل اثنتين
3 قادر على عمل ثلاث
4 قادر على عمل أربعة
5 قادر على عملهم كلهم

الركض

29- الركض في اتجاه واحد على أرض مستوية بدون ألم*
* تحدد المسافة في صفحة الملاحظات
0 غير قادر على الهرولة أو الركض في اتجاه واحد على أرض مستوية
1 قادر على الهرولة أو الركض في اتجاه واحد على أرض مستوية ولكن مع ألم شديد في الرجل
2 قادر على الهرولة أو الركض في اتجاه واحد على أرض مستوية مع عرج شديد من دون ألم
3 قادر على الهرولة أو الركض في اتجاه واحد على أرض مستوية مع عرج خفيف** بدون ألم
4 قادر على الهرولة أو الركض في اتجاه واحد على أرض مستوية بدون عرج ولا ألم ولكن أتعب بسرعة
5 قادر على الهرولة أو الركض في اتجاه واحد على أرض مستوية من دون ألم ولا تعب ولا عرج.
** عرج خفيف بشكل غير متواصل خلال المشي

30- الركض على سطح غير مستوي مع تغيير الاتجاه وسرعة المشي وعدم وجود مشاكل لاحقاً*
* يتم تحديد المسافة في صفحة الملاحظات

- الركض باتجاهات مختلفة
- الركض على أرض غير مستوية
- استطاعة تغيير سرعة الركض
- الركض على أرض مستوية
- الركض باتجاه واحد

0 غير قادر على عمل أي منهم
1 قادر على عمل واحدة
2 قادر على عمل اثنتين
3 قادر على عمل ثلاث
4 قادر على عمل أربعة
5 قادر على عملهم كلهم

31- الهرولة من دون ألم
0 غير قادر على المشي المسافة المطلوبة* بدون ألم
1 قادر على مشي المسافة المطلوبة* بدون ألم
2 الألم يقاطع الهرولة ولكن قادر على هرولة المسافة المطلوبة
3 قادر على تغيير سرعة الهرولة من دون ألم
4 قادر على تغيير اتجاه الهرولة من دون ألم
5 قادر على هرولة المسافة المطلوبة* بدون ألم

صعود ونزول السلالم

32- صعود السلالم بدون ألم*
* يتم تحديد كم درجة في صفحة الملاحظات
0 الألم يمنع صعود الدرجات
1 الألم يمنع صعود الدرجات ولكن أستطيع المشي بنفس الطابق بدون ألم
2 الألم يقاطع صعود الدرجات ولا أستطيع المتابعة بدون مساعدة
3 الألم يقاطع صعود الدرجات ولكنني أستطيع المتابعة بدون مساعدة
4 الألم موجود عند صعود الدرجات ولكنني أستطيع المواصلة من غير مقاطعة
5 ليس هنالك ألم عند صعود الدرجات

القرمزة من وضعية الوقوف

22- القرمزة من وضعية الوقوف
0 قادر على ثني الرأس الى الأمام
1 قادر على ثني الجذع الى الأمام
2 قادر على ثني الحوض
3 قادر على ثني الركبتين
4 قادر على ثني مفصل الكاحل
5 قادر على المحافظة على وضعية القرمزة بشكل مستقل

23- الوقوف من وضعية القرمزة
0 غير قادر على فرد الحوض والركبتين
1 قادر على فرد الركبتين
2 قادر على فرد الحوض
3 قادر على فرد أسفل الظهر الى الاعلى
4 قادر على فرد اعلى الظهر للوصول الى الاستقامة
5 رفع الراس الى الاعلى بالوضعية المحايدة

المشي

24- مشي مسافة خارج البيت
0 غير قادر على المشي الى الباب بدون الاحساس بالألم (خلال او بعد).
1 قادر على المشي داخل الغرفة من دون ألم
2 قادر على المشي الى الغرفة المجاورة من دون ألم
3 قادر على المشي في ممر البيت كاملاً (الكريدور) بدون ألم
4 قادر على المشي كل المسافات داخل البيت، من دون ألم
5 قادر على المشي كل المسافات خارج البيت من دون ألم

25- المشي من دون الم في أسفل الظهر
0 غير قادر على البدء بالوقوف من الجلوس للتحضير للمشي بسبب ألم أسفل الظهر
1 قادر على البدء بالوقوف من الجلوس للتحضير للمشي، ولكن غير قادر على المشي بسبب ألم أسفل الظهر
2 ألم أسفل الظهر يقاطع المشي ولا أقدر المواصلة
3 ألم أسفل الظهر يقاطع المشي ولكن أستطيع المواصلة
4 قادر على المشي بدون مقاطعة مع وجود الألم في أسفل الظهر
5 قادر على المشي من دون ألم في أسفل الظهر

26- المشي بشكل مستقل

- المشي الى الامام
- المشي الى الخلف
- المشي جانبياً
- المشي خلال حلقة
- المشي حول عوائق

0 غير قادر على عمل أي منهم
1 قادر على عمل واحدة
2 قادر على عمل اثنتين
3 قادر على عمل ثلاث
4 قادر على عمل أربعة
5 قادر على عملهم كلهم

27- المشي بشكل مستقل
0 غير قادر على المشي
1 أمشي بمساعدة قاعدتين للدعم (شخصين).
2 أمشي بمساعدة قاعدة واحدة للدعم (شخص).
3 أمشي بمساعدة عكاز أو إطار للمشي
4 أمشي بدون أي مساعدة ولكن بظهر ملتوي للأسفل أو الجانب
5 أمشي بدون مساعدة أحد وبظهر معتدل

33- صعود الدرجات*

* يتم تحديد كم درجة في صفحة الملاحظات

0 غير قادر على وضع القدم على الدرجة

1 قادر على نقل القدم على الدرجة وتحميل وزن الجسم على القدم الأخرى مع المحافظة على توازن الجسم

2 قادر على نقل وزن الجسم على القدم الموضوعة على الدرجة

3 قادر على فرد الركبة الأمامية حاملة الوزن والحوض.

4 قادر على ثني الحوض والقدم غير حاملة الوزن

5 قادر على وضع القدم الأخرى على الدرجة

34- استخدام السلالم* بدون ألم

* يتم تحديد عدد الدرجات في صفحة الملاحظات

- غير قادر على تحميل وزن الجسم بدون ألم
- غير قادر على صعود الدرج بدون ألم
- غير قادر على نزول الدرج بدون ألم
- غير قادر على المحافظة على التوازن بسبب الألم
- احتاج مساعدة عند صعود الدرج بسبب الألم

0 كل هذه المشاكل موجودة

1 وجود أربعة مشاكل

2 وجود ثلاثة مشاكل

3 وجود مشكلتين

4 وجود مشكلة واحدة

5 لا يوجد أي من هذه المشاكل

35- نزول الدرجات*

* يتم تحديد عدد الدرجات في صفحة الملاحظات

0 غير قادر على وضع القدم على الدرجة السفلية

1 قادر على نقل القدم على الدرجة السفلية مع تحميل الوزن على القدم الأخرى

2 قادر على وضع القدم غير حاملة الوزن على الدرجة السفلية

3 قادر على نقل الوزن على القدم الموضوعة على الدرجة السفلية

4 قادر على ثني الحوض والركبة والكاحل للقدم الخلفية

5 قادر على وضع القدم الأخرى على الدرجة السفلية

<u>تحميل الأوزان</u>

36- تحميل الأوزان بدون ألم

0 غير قادر على ثني الجذع بسبب الألم

1 قادر على ثني الحوض بدون ألم

2 قادر على رفع **(حدد الوزن الأقل بالكيلو غرام)** ولكن لا أستطيع المواصلة بسبب الألم

3 قادر على رفع **(حدد الوزن الأقل بالكيلو غرام)** بدون ألم

4 قادر على رفع **(حدد الوزن المتوسط بالكيلو غرام)** بدون ألم

5 قادر على رفع **(حدد الوزن الأكبر بالكيلو غرام)** بدون ألم

Appendix K: Invitation to a scientific meeting

The University Of Sheffield.

Low back pain physical functioning indicators

We have the pleasure of inviting you to participate in a scientific meeting on the *"Development and validation of TELER physical functioning indicators for use in musculoskeletal rehabilitation for people with low back pain".*

The meeting will take place on the 20th of December 2013 in the Jordanian Society of Physiotherapy, Tabarbour.

Aim of the meeting

The objective of this scientific meeting is to obtain experts opinion of a newly developed measurement tool that measures functional activities following physiotherapy. We are inviting academics and clinicians from physiotherapy clinics to participate and attend this meeting. Participants will be experts in the measurement, musculoskeletal physiotherapy, or the TELER method of measurement.

Meeting Plan

We are aiming to make the day interesting and useful to you as well as informative to us. The meeting will consist of three parts:

1- A short presentation of the protocol by which the TELER physical functioning indicators were developed.
2- An introduction to the TELER method of measurement.
3- A structured discussion to generate consensus on the TELER physical functioning indicators. These indicators will then be tested in three private physiotherapy clinics in Amman.

If you would like to participate in this meeting, we would be thankful if you could respond as soon as possible to Thamer Altaim (t.altaim@sheffield.ac.uk / 0785818800).

We look forward to hearing from you soon.

Yours sincerely,

Thamer Ahmad Altaim

Appendix L: Topic guideline for experts' meetings

The University Of Sheffield.

Scientific meeting: Development and validation of TELER physical functioning indicator for use in musculoskeletal rehabilitation for people with low back pain

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Consensus meeting: A questionnaire to assess the validity of the TELER physical functioning indicator for use in musculoskeletal rehabilitation for people with low back pain

Thamer Ahmad Altaim

- Please note that this questionnaire contains a working sheet for each TELER physical functioning indicator.
- You will be given 5 minutes to complete each evaluation sheet during the meeting.
- Please answer each question by placing a mark in the appropriate box.
- In the case you answer (NO) or (Don't know) for any of the questions, please answer the questions provided below the table.

TELER indicator	Assessment of validity	Yes	No	Don't know
1	Q1: Does this TELER function indicator seems to measure what is intended to measure?			
	Q2: Are there any codes that do not denote a clinically significant outcome, that is, an outcome that can be justified by reference to clinical or other relevant knowledge?			
	Q3: Are there any codes that do not have one clinical meaning?			
	Q4: Are there any codes that do not denote a clinically significant change between two successive codes, that is, a change that can be explained by reference to clinical or other relevant knowledge?			
	Q5: Are there any codes that do not denote an improvement or lack of deterioration between two successive codes that requires a clinically significant amount of therapeutic input?			

If you have answered (**Yes)** or (**DON'T KNOW)** for any of the above question, please answer the following questions.
It is important that you write down all your ideas and thoughts as these would form the bases for the next rounds of the validation process:
Why have you answered Yes/don't know?

How would you change the code to satisfy what is required by the question?

The University Of Sheffield.

اجتماع علمي لتطوير و المصادقة على صحة استخدام اسئلة TELER الخاصة بمشاكل الحركة (القدرة البدنية)

الناتجة عن مشكلة الم أسفل الظهر

اسم الباحث: ثامر أحمد التيم

- يرجى ملاحظة ان هذا النموذج يحتوي على اسئلة خاصة **بكل مؤشر** من مؤشرات نظام TELER
- سوف يتم اعطائك **خمسة دقائق** لملئ كل نسخة من نسخ التقييم خلال الاجتماع.
- يرجى الاجابة عن كل سؤال بوضع علامة في المكان المناسب.
- في حالة انك اخترت (لا) او (لا أعلم) لأي من الاسئلة في الجهة الأخرة من هذه الورقة ، يرجى تزويدنا بمزيد من التوضيح في الاماكن المخصصة تحت الجدول.

مؤشر TELER الوظيفي	تقييم مدى صحة و ملائمة المؤشرات التالية	نعم	لا	لا أعلم
	1. هل ما هو مكتوب (الكلمات المستخدمة) في مؤشر **TELER** الوظيفي تعطي خيارات يمكنها قياس المفهوم أو الفكرة المراد فحصها؟			
	2. هل تحتوي أي **من الخيارات المتاحة** في هذا المؤشر، جمل لا تمثل تغيير واضح و هام في مخرجات العلاج ؟ ، يقصد بهذا، أن التغير السريري في حالة المريض يمكن تفسيره بالرجوع إلى المعرفة السريرية أو المعارف الأخرى ذات الصلة؟			
	3. هل يوجد في خيارات هذا المؤشر جمل تحمل أكثر من معنى مرتبط بمخرجات العلاج؟			
	4. هل هناك ما بين أي من الخيارات جمل لا تدل على تغير سريري مهم بين اثنين من الخيارات المتعاقبة، يقصد بهذا، أن التغير السريري في حالة المريض يمكن تفسيره بالرجوع إلى المعرفة السريرية أو المعارف الأخرى ذات الصلة؟			
	5. هل هناك أي خيارات لا تدل على حدوث تحسن أو تدهور او انعدام التغيير في حالة المريض بين اثنين من الخيارات المتعاقبة التي تتطلب قدرا كبيرا من المدخلات العلاجية (اساليب العلاج الطبيعي)؟			

يرجى منك الاجابة على الاسئلة التالية في حالة كانت الاجابة **(لا)** او **(لا أعلم)** لاي من الاسئلة أعلاه.
يرجى منك كتابة أفكارك و أقتراحاتك في الاماكن المخصصة حيث ان هذه الملاحظات سوف تُمثل جزء هام من المرحلة القادمة من مراحل التأكد من صحة و ملائمة المؤشرات.
لماذا قمت بالاجابة ب **(لا)** او **(لا أعلم)**؟ يرجى كتابة رقم السؤال و من ثم كتابة أفكارك.

لو اتيحت لك الفرصة لتغيير الخيارات (الجمل) في هذا المؤشر، ما هي التغييرات المطلوبة في الخيارات لتلبية ما هو مطلوب من السؤال؟

Appendix M: Physiotherapists' consent form for the expert validation

The University Of Sheffield.

Participant information sheet (Experts' meeting)

Study title	**Development and validation of TELER physical functioning indicator for use in musculoskeletal rehabilitation for people with low back pain**
Principal researcher	Thamer Ahmad Altaim
Telephone number	+ 962 (0) 7 85-818-800

Study Sponsor: The University of Sheffield, United Kingdom.

We would like to invite you to take part in our research study. Please, before you decide we would like you to understand the purpose of this research and what it would request you to be involved-in. Please, ask us if there is anything that is not clear.

Participant name:

Date:

You will be given a copy of this information sheet to keep for your own record.

1. What is the purpose of this study?
The purpose of this research is to take your opinion on a number of TELER physical functioning indicators designed to trace changes in functions for individuals with LBP.

2. What is TELER?
TELER is a scientific method for measuring changes in patients' health status using specific questions that is tailored to the condition under examination.

3. Why have I been invited?
You have been invited because the Jordanian society of physiotherapy recommended your name for the purpose of this study (see above). We are recruiting experts in the field of musculoskeletal rehabilitation who have extensive experience in the management of low back pain, outcome measures or TELER method of measurement.

4. Do I have to take part?
Your decision to take part in this study is entirely voluntary. You may refuse to participate or you can withdraw from the study at any time and without given reason.

5. What will happen to me if I take part?
If you decide to participate in the study, you will be required to attend a meeting regarding the research topic. Please understand that we might invite you to attend more than one meeting to explore your opinion in selected TELER indicators.

6. Expenses and payment
You will not be paid for taking part in this study.

7. What do I have to do?
If you agree to take part in the study, we will ask you to attend a meeting regarding the research topic.

8. What are the possible disadvantages and risks of taking part?
There are no disadvantages or risks in taking part in this study.

9. What are the possible benefits of taking part?
There are no clinical / personal benefits to you if you decided to take part in this study. However, the information extracted from this part of the study will help us in the future to improve our understanding and knowledge about low back pain.

10. What if there is a problem or I want to complain?

If you have any queries or questions please contact:
The director of studies: Prof. Sue Mawson
Email: s.mawson@sheffield.ac.uk
ScHARR Research Ethics Committee :
Telephone: +44 (0)114 222 2965
Email : scharr-rec@sheffield.ac.uk

11. Will my decision to take part in this study be kept confidential?
All information that is collected / recorded about you during the study will be kept safe and secure. Electronic data will be kept on a secured laptop and recoded data will be kept in a secured locker. The documents relating to the administration of this research, such as the consent form you sign to take part, will be kept in a folder called a site file or project file. This is locked away securely. The folder might be checked by people in authority who want to make sure that researchers are following the correct procedures. These people will not pass your details to anyone else. The documents will be destroyed five years after the end of the study.

12. What will happen to the results of the research study?

The results of this study will be discussed with the supervisory team of this research programme anonymously. It is anticipated that the results will be published in a peer reviewed journal. However, those who are interested on study results will be sent a newsletter that shows these results.

13. Who is sponsoring the study?

The sponsor of this study is the University of Sheffield, United Kingdom.

14. Who has reviewed this study?

This study is approved by Sheffield Hallam University, the Ministry of Health in Jordan and the Jordanian University of Science and Technology Research Ethics Committees. These Committees are run by these organisations but its members are not connected to the research they examine. Please note that Sheffield University ethics committee recognises these committees. These Research Ethics Committees have reviewed this study and given a favourable opinion.

15. Further information and contact details
Please contact the main researcher:
Thamer Ahmad Altaim
Email address: t.altaim@sheffield.ac.uk

Participant consent form

Study title:	**Development and validation of TELER physical functioning indicator for use in musculoskeletal rehabilitation for people with low back pain**
Principal researcher	Thamer Ahmad Altaim
Telephone number	+ 962 (0) 7 85-818-800

Participant name:	

	Please read the following statements and put your initials in the box to show that you have read and understood them and that you agree with them	**Please initial each box**
1	I confirm that I have read and understood the information sheet dated (/ /) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
2	I understand that my involvement in this study is voluntary and that I am free to withdraw at any time, without give any reason.	
3	I understand that relevant sections of my notes and data collected during the study may be looked at by the supervisory team, responsible individuals from the Sponsor, the Research Ethics Committee, where it is relevant to this research. I give permission for these individuals to have access to my data.	
4	I understand that data gathered could be used in future research related to this study.	
5	I agree to take part in this study	

To be filled in by the participant

I agree to take part in the above study

Your name	Date	Signature

To be filled in by the person obtaining consent

I confirm that I have explained the nature, purposes and possible effects of this research study to the person whose name is printed above.

Name of investigator	Date	Signature

Filing instructions

1 copy to the participant
1 original in the Project or Site file
1 copy in the medical notes (if applicable)

Thank you for your participation on this study, your help is much appreciated.

Appendix N: Summary of NGT suggestions and comments

Indicator 1:

- Physiotherapists who took part in the NGT suggested replacing this indicator with a quiz-style indicator that covers all activities identified, in the qualitative study, as important to Jordanian individuals with LBP. This quiz-style indicator will play a key role in facilitating the partnership process between a physiotherapist and an individual with LBP. It will document all functional outcomes that are important to a LBP patient and determines whether or not selected goals were achieved by the end of physiotherapy. The quiz-style indicator is also important as a control point to exclude these TELER indicators that are not important to the patient (reduce the number of TELER indicators in the TELER LBP questionnaire).
- The NGT also recommended adding the following words: "Low back pain does not prevents …", "Low back pain prevents …" and " … due to low back pain" to clarify that any limitations in functional performance were because of LBP and not something else such as the inability to walk because of rheumatoid arthritis in the knees joints.
- Participants suggested using the TELER clinical note system to document any other conditions that the patients might have other than LBP.
- Participants pointed out that some of the LBP patients might restore all of their lost functions despite the fact that they continue to experience the symptoms of LBP. They suggested involving the patient in the measurement process and discussing the possibility of a discharge without reaching to code 5.
- Participants suggested that the notes section in part 1 in the TELER LBP questionnaire could be used to document important information such as pain location or the presence of a carer.
- The NGT recommended adding question 29 in part 1 in order to ensure that the list in the quiz-style questionnaire included all outcomes that are important to the patient and to ensure that this list does not limit choices.
- Consensus reached in the first session to replace this indicator with a list of activities in the first part of TELER LBP questionnaire.

Indicator 2:

- The NGT consented that this TELER indicator is important for the measurement of any activity that therapists cannot break it down into components (movement analysis) because of the its nature (e.g. maintaining a position) or the differences between individuals in the performance of such an activity.
- Participants recommended few changes to the Arabic translation to enhance clarity (e.g. code 5 عدم الألم يقاطع النشاط المسمى مع عدم المقدرة على المتابعة/ code1 الشعور بألم خلال النشاط و بعد الانتهاء منه / code 4: الشعور بالألم بعد إكمال النشاط المسمى /
- Participants agreed that each code was clear and provided a singular meaning.
- Consensus reached in the first session to include the amended indicator in the TELER LBP questionnaire.

Indicator 3:

- Participants pointed out that some of the activities included in this indicator were covered in more details in other TELER indicators in the same questionnaire.
- Participants identified redundancy and overlap between codes (e.g. standing).
- There are two types of toilets in Jordan and the movements required to use each one of them are different. The codes in this indicator do not cover the movements necessary to use a squat toilet.
- Participants found the words "*managing clothes*" a source of confusion as it carries more than one meaning and requires more clarifications.
- Participants recommended excluding this indicator from the TELER LBP questionnaire.
- Consensus reached in the first session to exclude this indicator.

Indicator 4:

- Participants indicated that all of the activities in this indicator can be performed in, at least, two different positions. For example, washing the feet can be performed over the bathroom sink (fully bending hip and knee joints/internal rotation in hip) or in the bathtub (partial bending of hip and full extension in knee joint). The neurodynamics in each position is different.
- This might be a source of confusion as each choice in this indicator carry more than one meaning.
- Consensus reached in the first session to exclude this indicator [9/10].

Indicator 5:

- One of the participants indicated that the sequence of events in this indicator is incorrect. He suggested that the activity in code 4 should come before the activity mentioned in code 3. This is because the activity in code 3 is more difficult to achieve more than the activity mentioned in code 4.
- Participants consented that after reaching to code 1 the patient should be transferred to a sport medicine clinic. This is because the activities described in codes 2-5 require specialised training that is beyond physiotherapy management of LBP.
- Two physiotherapists suggested that the description of code 3 is unclear and carry more than one meaning [controlled and paced].
- Consensus reached in the first session to exclude this indicator.

Indicator 6:

- Participants suggested that this TELER indicator represents an "impairment" rather than "functional performance". It measures more than one construct at the same time which violate one of the principles of measurement in a clinical context.
- Consensus reached in the first session to exclude this indicator.

Indicator 7:

- Consensus reached in the first session to replace this indicator with the LBP quiz-style questionnaire [10/10].

Indicator 8:

- The codes in this indicator were similar to the codes in indicator 10.
- Consensus reached in the first session to exclude this indicator.

Indicator 9:

- Participants indicated that there were similarity between this indicator and indicator 8.
- One of the participants suggested to document whether the patient is under medication effect at the time of measurement of "functional performance".
- Consensus reached in the first session to exclude this indicator.

Indicator 10:

- Participants suggested the following changes:
  - Code 2: "Low back pain interrupts sleeping, unable to return back to sleep".
  - Code 3: "Low back pain interrupts sleeping, able to return back to sleep".
  - Code 4: "Low back pain does not interrupt sleeping, pain when waking up".
  - Code 5: "Low back pain does not prevent sleeping".
- Participants checked the translation and amended the Arabic indicator to reflect the changes made above.
- Consensus reached in the second session to include the amended indicator in the TELER LBP questionnaire.

Indicator 11:

- Participants suggested changing "مفصل الحوض" to "مفصل الورك".
- Consensus reached in the second session to include the amended indicator in the TELER LBP questionnaire.

Indicator 12:

- Participants recommended changing code 4 to "دفع الجسم الى الأعلى باستخدام الساعد".
- Consensus reached in the second session to include the amended indicator in the TELER LBP questionnaire.

Indicator 13:

- Participants recommended adding photos that demonstrate the activities described in each code. They suggested that this would enhance the clarity.
- Consensus reached in the second session to include this indicator in the TELER LBP questionnaire.

Indicator 14:

- Participants recommended changing "التقدم للأمام الى حافة السرير" to "الانتقال الى حافة السرير".
- Participant found similarities between this component indicator and indicator 15.
- Consensus reached in the first session to exclude this indicator.

Indicator 15:

- Participants recommended the following amendments:
  - Code 0: “Low back pain prevents standing up”.
  - Code 1: “Low back pain does not prevent sitting over the edge of the bed [with help]”.
  - Code 2: “Low back pain does not prevent sitting over the edge of the bed [without help]”.
  - Code 3: “Low back pain does not prevent transferring between sitting and standing [without help]”.
  - Code 4: “Low back pain does not prevent maintaining a standing position [without support]”.
  - Code 5: “Low back pain does not prevent walking away from bed [without help]”.
- Consensus reached in the second session to include the amended indicator in the TELER LBP questionnaire.

Indicator 16:

- Participants recommended the following amendments:
  - Code 0: “Low back pain prevents standing up from sitting position”.
  - Code 2: “قادر على نقل الوزن فوق الأقدام” to “قادر على حمل وزن الجسم على الأقدام”.
  - Adding to Code 4 “ليس جميعهم”.
  - Code 5: “قادر على فرد الحوض و الركبتين و الجذع بشكل كامل لتحقيق وضعية الوقوف باستقامة”.
- Participants agreed that the codes represent a recovery pattern and each code provide a singular meaning.
- Consensus reached in the third session to include the amended indicator in the TELER LBP questionnaire.

Indicator 17:

- Participants reviewed the translation and recommended few changes to the language to enhance the clarity.
- Participants agreed that the codes represent a recovery pattern and each code provide a singular meaning.
- Consensus reached in the third session to include the amended indicator in the TELER LBP questionnaire.

Indicator 18:

- Participants reviewed the translation and recommended few changes to the language to enhance the clarity.
- Participants recommended adding photos that demonstrate the activities described in each code. They suggested that this would enhance the clarity.
- Consensus reached in the third session to include the amended indicator in the TELER LBP questionnaire.

Indicator 19:

- Participants reviewed the translation. They did not recommend any changes.
- Participants agreed that the codes represent a recovery pattern and each code provide a singular meaning.
- Consensus reached in the third session to include this indicator in the TELER LBP questionnaire.

Indicator 20:

- Participants reviewed the translation. They did not recommend any changes.
- Participants agreed that the codes represent a recovery pattern and each code provide a singular meaning.
- Consensus reached in the third session to include this indicator in the TELER LBP questionnaire.

Indicator 21:

- Participants recommended the following amendments:
  - Changing the title "تحريك الجذع الى الأمام من دون الشعور بألم".
  - Code 0: "Low back pain prevents bending the trunk forward".
  - Code 1: "Low back pain does not prevent initiating forward bending, pain free at standing position".
  - Code 2: "Low back pain prevents reaching to the mid-range of forward bending, unable to continue".
  - Code 3: "Low back pain does not prevent reaching to the mid-range of forward bending; however, unable to fully forward bend the trunk".
  - Code 4: "Low back pain when reaching to full forward bending".
  - Code 5: "Low back pain does not prevent forward bending [feeling no pain].
- Participants recommended developing a new indicator that measure LBP patients to extend their back from a forward bending position. The new indicator was created in the same meeting and was validated by the participants.
- Consensus reached in the third session to include the amended indicator in the TELER LBP questionnaire.

Indicator 22:

- Participants recommended the following amendments:
  - Changing "قرمزة" to "قرفصاء".
  - Changing "مفصل الحوض" to "مفصلي الورك".
  - Code 0: "Low back pain prevents squatting".
  - Code 1: "Low back pain does not prevent leaning forward in preparation of squatting".
  - Code 2: "Low back pain interrupts bending the hips, knees and ankles joints, unable to continue".
  - Code 3: "Low back pain interrupts bending the hips, knees and ankles joints, able to continue".
  - Code 4: "Low back pain does not prevent squatting, unable to maintain this position due to low back pain".
  - Code 5: "Low back pain does not prevent squatting and able to maintain this position".
- Consensus reached in the fourth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 23:

- Participants recommended the following amendments:
  - Changing "قرمزة" to "قرفصاء".
  - Changing "مفصل الحوض" to "مفصلي الورك".
  - Code 0: "Low back pain prevents standing up straight from squatting position".
  - Code 1: "Low back pain interrupts extending the hips, knees and ankles joints, unable to continue".
  - Code 2: "Low back pain interrupts extending the hips, knees and ankles joints, able to continue".
  - Code 3: "Low back pain does not prevent raising the lower back upwards.
  - Code 4: "Low back pain does not prevent raising the upper back upwards to fully straighten up".
  - Code 5: "Low back pain does not prevent standing up straight from squatting".
- Consensus reached in the fourth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 24:

- Participants suggested limiting the activities in this indicator to walking inside the house. This was clarified in the title of the indicator [Walking a distance indoors].
- Participants recommended the following amendments:
  - Code 0: "Low back pain prevents walking to the door of the room".
  - Code 1: "Low back pain does not prevent walking to the door of the room".
  - Code 2: "Low back pain does not prevent walking to the next room".
  - Code 3: "Low back pain does not prevent walking all distances indoors with the presence of symptoms".
  - Code 4: "Low back pain does not prevent walking all distances indoors, pain after the completion of walking".
  - Code 5: "Low back pain does not prevent walking all distances indoors, pain free during and after the completion of walking".
- Consensus reached in the fourth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 25:

- Participants suggested limiting the activities in this indicator to walking outside the house. This was clarified in the title of the indicator [Walking a distance outdoor].
- Participants recommended the following amendments:
  - Code 0: "Low back pain prevents walking to the door of the room".
  - Code 1: "Low back pain does not prevent walking to the door of the room".
  - Code 2: "Low back pain does not prevent walking to the next room".
  - Code 3: "Low back pain does not prevent walking all distances indoors with the presence of symptoms".
  - Code 4: "Low back pain does not prevent walking all distances indoors, pain after the completion of walking".
  - Code 5: "Low back pain does not prevent walking all distances indoors, pain free during and after the completion of walking".
- Consensus reached in the fourth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 26:

- Participants suggested that this component indicator is similar to indicator 28.
- Consensus reached in the fourth session to exclude this indicator.

Indicator 27:

- Participants recommended the following amendments:
  - Code 0: "Low back pain prevents walking".
  - Code 1: "Low back pain does not prevent walking with help from two bases of support [two individuals]".
  - Code 2: "Low back pain does not prevent walking with help from one base of support [a person]".
  - Code 3: "Low back pain does not prevent walking with help of stick".
  - Code 4: "Low back pain does not prevent walking without support but with bent trunk".
  - Code 5: "Low back pain does not prevent walking without support and with a straight back".
- Participants validated the translation.
- Consensus reached in the fourth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 28:

- Participants validated the translation.
- Participants did not recommend any changes to this indicator.
- Consensus reached in the fourth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 29:

- Participants suggested that jogging and running were two different activities; therefore, they recommended splitting this indicator into two functional indicators.
- Participants indicated that it is illogical to expect a LBP patient to limp without pain.
- The recovery pattern is unclear especially between codes 3 and 4.
- Participants recommended the following amendments:
  - Code 0: "Low back pain prevents jogging **specify distance**".
  - Code 1: "Low back pain interrupts jogging **specify distance**, unable to continue".
  - Code 2: "Low back pain interrupts jogging **specify distance**, able to continue".
  - Code 3: "Low back pain during jogging **specify distance**, able to continue without interruption".
  - Code 4: "Low back pain does not prevent jogging **specify distance**, pain in the lower back after the completion of the task".
  - Code 5: "Low back pain does not prevent jogging **specify distance**".
- Consensus reached in the fifth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 30:

- Participants indicated that there were an overlap between the first choice and the last choice in the list.
- Consensus reached in the fifth session to exclude this indicator.

Indicator 31:

- Participants recommended the following amendments:
  - Code 0: "Low back pain prevents running **specify distance**".
  - Code 1: "Low back pain interrupts running **specify distance**, unable to continue".
  - Code 2: "Low back pain interrupts running **specify distance**, able to continue".
  - Code 3: "Low back pain during running **specify distance**, able to continue without interruption".
  - Code 4: "Low back pain does not prevent running **specify distance**, pain in the lower back after the completion of the task".
  - Code 5: "Low back pain does not prevent running **specify distance**".

Consensus reached in the fifth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 32:

- Participants recommended the following amendments:
  - Code 0: "Low back pain prevents climbing up stairs".
  - Code 1: "Low back pain interrupts climbing up stairs, unable to continue".
  - Code 2: "Low back pain interrupts climbing up stairs, able to continue".
  - Code 3: "Low back pain during climbing up stairs, able to continue without interruption".
  - Code 4: "Low back pain does not prevent climbing up stairs, pain in the lower back after the completion of the task".
  - Code 5: "Low back pain does not prevent climbing up stairs".

Consensus reached in the fifth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 33:

- Participants validated the translation.
- Participants did not recommend any changes to this indicator.
- Consensus reached in the fifth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 34:

- Participants recommended using this component indicator as a control point that direct to other indicators.
- Participants validated the translation.
- Participants did not recommend any changes to this indicator.
- Consensus reached in the fifth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 35:

- One of the participants suggested that in order to place the non-weight bearing in the lower steep, the patient should be able to bend the rear leg. Therefore, the descriptors of code 3 and 4 were reversed.
- Consensus reached in the fifth session to include the amended indicator in the TELER LBP questionnaire.

Indicator 36:

- Participants recommended adding two functional indicators for carrying weights and lowering a carried weight. These indicators were constructed in the same session and were validated by physiotherapists.
- Participants recommended changing weights in the codes to represent "objects" and not "kilograms".
- Consensus reached in the fifth session to include these indicators in the TELER LBP questionnaire.

Appendix O: TELER LBP indicators following the expert panel meetings

A1 - Sleeps continuously without disruption due to low back pain (without taking medications) 0 Unable to sleep due to pain*. 1 Wakes up from sleeping due to pain*, unable to go back to sleep due to this pain*. 2 Wakes up from sleeping due pain*, but able to go back to sleep. 3 There is pain* but it doesn't prevent and doesn't interrupt sleep 4 There is no pain* in going to sleep, but there is pain* on waking up. 5 Pain* free in sleeping and in waking up. * Pain in the lower back	**A1 - النوم بشكل متواصل بدون مقاطعة بسبب الألم في أسفل الظهر (و بدون أخذ المسكنات)** 0 غير قادر على النوم بسبب الألم في أسفل الظهر 1 استيقظ من النوم بسبب الألم في أسفل الظهر، وبسببه غير قادر على العودة الى النوم 2 استيقظ من النوم بسبب الألم في أسفل الظهر، لكن قادر على العودة للنوم 3 الألم في أسفل الظهر موجود ولكنه لا يمنع ولا يقاطع النوم 4 ليس هنالك ألم في أسفل الظهر عند الخلود للنوم ولكن الألم عند الانتهاء من النوم 5 **نوم** متواصل بدون ألم في أسفل الظهر ولا لاحقاً عند الاستيقاظ
B1 – Bed mobility (not hierarchical) • Able to bend hips and knees. • Able to maintain hips and knees in flexion • Able to lift bottom • Able to shift bottom across • Able to shift shoulders and head across 0 Unable to do any of the above mentioned activities* 1 Able to do one* 2 Able to do two* 3 Abel to do three* 4 Able to do four* 5 Able to do all *Due to low back pain	**B1 - الحركة في السرير (غير تصاعدي)** • قادر على ثني مفصلي الورك والركبتين • قادر على المحافظة على ثني مفصلي الورك والركبتين • قادر على رفع المؤخرة • قادر على تحريك المؤخرة للجانب • قادر على تحريك الكتفين والرأس للجانب 0 **غير قادر على تحقيق أي منهم*** 1 **قادر على تحقيق واحدة *** 2 **قادر على تحقيق اثنتين *** 3 **قادر على تحقيق ثلاثة *** 4 **قادر على تحقيق أربعة *** 5 **قادر على تحقيقهم كلهم** * **بسبب ألم أسفل الظهر**
B2 – Lying to sitting over edge of bed 0 Cannot move functionally in bed* 1 Can achieve crock lying** 2 Can achieve modified bridge to move sideways** 3 Can roll into side lying (with knees bent) ** 4 Push the body upwards supported on forearms** 5 Able to achieve sitting at the edge of the bed (by dropping legs over side and pushing the body upwards using arms) ** *Due to low back pain ** Low back pain does not prevent this movement.	**B2 - النهوض من الاستلقاء الى الجلوس على طرف السرير** 0 لا أستطيع الحركة في السرير بسبب الألم في أسفل الظهر 1 أستطيع ثني الركبتين خلال الاستلقاء 2 أستطيع رفع الجسم كجسر للتحرك الى الجانبين 3 أستطيع الدوران الى النوم على الجانب (مع ثني الركبتين) 4 دفع الجسم للأعلى بالاستناد على الساعد 5 أستطيع تحقيق الجلوس على طرف السرير (عن طريق إنزال القدمين الى الجانب ودفع الجسم للأعلى باليد)
B3 – Lying to sitting on bed 0 Unable to sit in bed from lying due to low back pain 1 Able to lift and turn head and upper trunk** 2 Able to move arm under the body and rotate head and the upper trunk** 3 Able to extend the supporting arm, rotate lower trunk and lift legs off bed** 4 Able to transfer weight onto bottom** 5 Able to get into sitting and release/use/lift arms** ** Low back pain does not prevent this movement.	**B3 - النهوض من الاستلقاء للجلوس على السرير مع فرد الرجلين** 0 غير قادر على الجلوس على السرير من وضعية الاستلقاء بسبب ألم أسفل الظهر 1 قادر على رفع وتدوير الرأس والجذع العلوي من الجسم 2 قادر على تحريك اليد تحت الجسم وتدوير الجزء العلوي من الجذع 3 قادر على فرد اليد الداعمة للجسم، تدوير الجزء السفلي من الجذع ورفع القدمين على السرير 4 قادر على تحميل الوزن على المؤخرة. 5 قادر على الجلوس ورفع الأيدي عن السرير

C1 – Get out of bed without help 0 Unable to get out of bed due to low back pain 1 Able to achieve sitting over the edge of the bed with help 2 Able to achieve sitting over the edge of the bed without help 3 Able to transfer between sitting and standing without help 4 Able to maintain standing without support 5 Walking away from the bed without help	**C1 - الخروج من السرير بدون مساعدة** 0 غير قادر على الخروج من السرير بسبب ألم في أسفل الظهر 1 قادر على تحقيق وضعية الجلوس على طرف السرير بمساعدة 2 قادر على تحقيق وضعية الجلوس وبدون مساعدة 3 قادر على التنقل من الجلوس الى الوقوف وبدون مساعدة 4 المحافظة على وضعية الوقوف بدون مساعدة 5 المشي بعيداً عن السرير من دون مساعدة
D1 – Standing up straight from sitting 0 Unable to stand from sitting due to low back pain 1 Able to move forwards on bed or chair* 2 Able to transfer body weight over feet* 3 Able to lift bottom off bed or chair* 4 Able to fully extend hips, knees or trunk (not all of them) to achieve standing* 5 Able to fully extend hips, knees and trunk to achieve standing up straight* * Low back pain does not prevent this movement.	**D1 - الوقوف باستقامة من الجلوس** 0 غير قادر على الوقوف من الجلوس بسبب ألم أسفل الظهر 1 قادر على التحرك للأمام من فوق الكرسي أو السرير 2 قادر على حمل وزن الجسم على الأقدام 3 قادر على رفع المؤخرة من على الكرسي أو السرير 4 قادر على فرد أي من الحوض أو الركبتين أو الجذع بشكل كامل (ليس جميعهم). 5 قادر على فرد الحوض والركبتين والجذع بشكل كامل لتحقيق وضعية الوقوف باستقامة
D2 – Sitting from standing 0 Sits down with no control due to low back pain 1 Brings body weight forwards, from standing position 2 Bends hips and knees 3 Use arms to support sitting 4 Lowers smoothly onto bed or chair 5 Sitting completely/properly on the bed or chair	**D2 - الجلوس من الوقوف** 0 الجلوس من دون تحكم بسبب ألم أسفل الظهر 1 إحضار وزن الجسم الى الأمام في وضعية الوقوف 2 ثني مفصلي الورك والركبتين 3 استخدام اليدين للمساعدة على الجلوس 4 إنزال الجسم بشكل سلس الى الكرسي أو السرير 5 الجلوس بشكل كامل وبدون ألم
D3 – Standing up straight from floor sitting 0 Unable to transfer weight in side sitting due to low back pain 1 Able to transfer weight in side sitting 2 Able to transfer weight forwards over knees (in order to achieve kneeling position). 3 Able to extend hips into high kneeling and place non weight bearing foot on the floor 4 Able to transfer weight onto the foot (forward) and extend the hip and knee 5 Able to stand up straight.	**D3 - الوقوف باستقامة من وضعية الجلوس على الأرض** 0 عدم المقدرة على نقل الوزن بوضعية الجلوس الجانبي بسبب ألم أسفل الظهر. 1 قادر على نقل وزن الجسم الى وضعية الجلوس الجانبي 2 قادر على نقل الوزن الى الأمام فوق الركبتين (لتحقيق وضعية الوقوف على الركب) 3 قادر على فرد مفصلي الورك الى الأعلى لأخذ وضعية الوقوف على الركب ومن ثم تحريك القدم غير محملة الوزن على الأرض 4 قادر على تحميل الوزن على القدم الأمامية وفرد مفصلي الورك والركبة 5 قادر على الوقوف باستقامة
E1 – Sitting for (specify time) without pain in the lower back 0 Unable to sit for (**specify time)** due to low back pain 1 Pain interrupts sitting for (**Specify time**), unable to continue 2 Pain interrupts sitting for (**Specify time**) but able to continue 3 Able to sit pain free for (**Specify time**) but experiences pain afterwards 4 Able to sit pain free for (**Specify time**) but discomfort afterwards 5 Able to sit for (**Specify time**) without problems	**E1 - الجلوس لمدة (حدد المدة الزمنية) بدون ألم في أسفل الظهر** 0 غير قادر على الجلوس لمدة (**حدد المدة الزمنية**) بسبب الألم في أسفل الظهر 1 الألم يقاطع الجلوس لمدة (**حدد المدة الزمنية**)، غير قادر على المتابعة 2 الالم يقاطع الجلوس لمدة (**حدد المدة الزمنية**) ولكنني قادر على المواصلة 3 قادر على الجلوس من دون ألم لمدة (**حدد المدة الزمنية**) ولكن هنالك ألم يكون لاحقاً 4 قادر على الجلوس من دون ألم لمدة (**حدد المدة الزمنية**) ولكن هنالك عدم ارتياح يكون لاحقاً 5 قادر على الجلوس لمدة (**حدد المدة الزمنية**) من دون مشاكل

F1 – Stands up straight for (Specify time) without low back pain 0 Unable to stand up straight for (**Specify time**) due to pain 1 Pain interrupts standing up straight for (**Specify time**), unable to continue 2 Pain interrupts standing up straight for (**Specify time**) but able to continue 3 Able to stand up straight pain free for (**Specify time**) but experiences pain afterwards 4 Able to stand up straight for (**Specify time**) pain free but experiences discomfort afterwards 5 Able to stand up straight for (Specify time) without problems	**F1 - الوقوف باستقامة لمدة (حدد المدة الزمنية) بدون ألم في أسفل الظهر** 0 غير قادر على الوقوف باستقامة لمدة (**حدد المدة الزمنية**) بسبب الألم في أسفل الظهر 1 الألم يقاطع الوقوف باستقامة لمدة (**حدد المدة الزمنية**)، غير قادر على المتابعة 2 الألم يقاطع الوقوف باستقامة لمدة (**حدد المدة الزمنية**) ولكنني قادر على المواصلة 3 قادر على الوقوف باستقامة من غير ألم لمدة (**حدد المدة الزمنية**) ولكن هنالك ألم يكون لاحقاً 4 قادر على الوقوف باستقامة من غير ألم لمدة (**حدد المدة الزمنية**) ولكن هنالك عدم ارتياح يكون لاحقاً 5 قادر على الوقوف باستقامة لمدة (**حدد المدة الزمنية**) من دون مشاكل
G1 – Bend trunk forward without feeling pain in the lower back 0 Unable to bend the trunk forwards because of pain 1 Pain on initiating forward bending, pain free at standing position 2 Pain on forward bending (before reaching mid-range of trunk movement), unable to continue 3 Pain on forward bending, able to continue but cannot fully bend the trunk 4 Pain when trunk is fully flexed 5 Full active range of trunk movement forwards, without feeling pain in the lower back	**G1 - ثني الجذع الى الامام من دون الشعور بالألم في أسفل الظهر** 0 غير قادر على ثني الجذع للأمام بسبب الألم في أسفل الظهر 1 الالم في أسفل الظهر يكون عند البدء بثني الجذع ولكن ليس هنالك ألم في وضعية الوقوف 2 الشعور بالألم في أسفل الظهر عند ثني الجذع (قبل الوصول لمنتصف مدى الحركة)، ولكن لا أستطيع المواصلة 3 الشعور بالألم في أسفل الظهر عند ثني الجذع وأستطيع المواصلة ولكن ليس بشكل كامل 4 الشعور بالألم في أسفل الظهر عند ثني الجذع بشكل كامل 5 ثني الجذع بشكل كامل للأمام بدون ألم في أسفل الظهر
G2 - Raising the trunk upwards to the upright position from bending forwards without feeling pain in the lower back 0 Unable to rise trunk upwards due to low back pain 1 Pain initiating on raising the trunk upwards, pain free when bending the trunk forwards. 2 Pain when raising the trunk upwards (before reaching mid-range of trunk movement), unable to continue 3 Pain when raising the trunk upwards, able to continue but cannot stand up upright 4 Pain when standing up upright. 5 Raises the trunk upward to stand up straight without feeling pain in the lower back	**G2 - رفع الجذع الى الأعلى من وضعية الثني للأمام من دون الشعور بالألم في أسفل الظهر** 0 غير قادر على رفع الجذع للأعلى بسبب الألم في أسفل الظهر 1 الالم يكون عند البدء برفع الجذع للأعلى ولكن ليس هنالك ألم في وضعية ثني الجذع للأمام 2 الشعور بالألم في أسفل الظهر عند رفع الجذع للأعلى (قبل الوصول لمنتصف مدى الحركة)، ولكن ليس بشكل كامل 3 الشعور بالألم في أسفل الظهر عند رفع الجذع للأعلى وأستطيع المواصلة ولكن ليس بشكل كامل 4 الشعور بالألم في أسفل الظهر عند الوقوف باستقامة 5 رفع الجذع للأعلى للوصول لوضعية الوقوف باستقامة بدون ألم في أسفل الظهر
H1 – Squatting from standing up straight and maintaining the position without pain 0 Unable to squat due to low back pain 1 Able to lean forwards in preparation of squatting 2 Pain* interrupts the ability to bend the hips, knees and ankle joints, unable to continue 3 Pain* interrupts the ability to bend the hips, knees and ankle joints, able to continue 4 Able to achieve squatting position, unable to maintain this position due to pain* 5 Able to maintain squatting position without feeling pain* * Pain in the lower back	**H1 - القرفصاء من الوقوف باستقامة و المحافظة عليها بدون ألم** 0 غير قادر على تحقيق وضعية القرفصاء بسبب ألم أسفل الظهر 1 قادر على ثني الجذع الى الأمام 2 الألم يقاطع القدرة على ثني مفصلي الورك والركبتين والكاحل، لا أستطيع المواصلة 3 الألم يقاطع القدرة على ثني مفصلي الورك والركبتين والكاحل، لكن أستطيع المواصلة 4 قادر على تحقيق القرفصاء ولكن لا أستطيع المحافظة عليها بسبب ألم أسفل الظهر 5 قادر على المحافظة على وضعية القرفصاء وبدون ألم في أسفل الظهر

H2 – Standing up straight from squatting position 0 Unable to stand up straight from a squatting position due to low back pain 1 Pain* interrupts the ability to extend the hips, knees and ankle joints, unable to continue. 2 Pain* interrupts the ability to extend the hips, knees and ankle joints, able to continue. 3 Able to raise the lower back upwards 4 Able to raise the upper back upwards to fully straighten up 5 Stands up straight from squatting without feeling pain* * Pain in the lower back	**H2 - الوقوف باستقامة من وضعية القرفصاء** 0 غير قادر على الوقوف باستقامة من وضعية القرفصاء بسبب ألم أسفل الظهر 1 الألم يقاطع القدرة على فرد مفصلي الورك والركبتين والكاحل، لا أستطيع المواصلة 2 الألم يقاطع القدرة على فرد مفصلي الورك والركبتين والكاحل، لكن أستطيع المواصلة 3 قادر على رفع أسفل الظهر الى الاعلى 4 قادر على رفع أعلى الظهر للوصول الى الاستقامة بالوقوف 5 الوقوف باستقامة من وضعية القرفصاء بدون ألم في أسفل الظهر
I1 - Functional walking (not hierarchical) • Walk in different directions • Change directions • Walk on different everyday surfaces • Able to negotiate slopes • Able to negotiate confined spaces 0 Unable to do any of the above mentioned activities* 1 Able to do one* 2 Able to do two* 3 Abel to do three* 4 Able to do four* 5 Able to do all *Due to low back pain	**I1 - أداء وظيفة المشي** • المشي في عدة اتجاهات • تغيير الاتجاهات • المشي على الأسطح المختلفة في الحياة اليومية • قادر على التعامل مع المنحدرات • قادر على التعامل مع الأماكن الضيقة 0 **غير قادر على عمل أي منهم*** 1 **قادر على عمل واحدة*** 2 **قادر على عمل اثنتين*** 3 **قادر على عمل ثلاث*** 4 **قادر على عمل أربعة*** 5 **قادر على عملهم كلهم** * **بسبب ألم أسفل الظهر**
I2 - Walk a distance indoors without low back pain 0 Unable to walk to the door of the room without feeling pain in the lower back (during or after) 1 Able to walk inside a room without feeling pain 2 Able to walk to the next room without feeling pain 3 Able to walk all distances indoors with the presence of pain* 4 Able to walk all distances indoors pain* free, pain after the completion of walking. 5 Able to walk all distances indoors, pain* free during and after the completion of walking * Pain in the lower back	**I2 - مشي مسافة داخل البيت بدون ألم في أسفل الظهر** 0 غير قادر على المشي الى باب الغرفة بدون الإحساس بالألم في أسفل الظهر (خلال او بعد). 1 قادر على المشي داخل الغرفة من دون ألم في أسفل الظهر 2 قادر على المشي الى الغرفة المجاورة من دون الشعور بألم في أسفل الظهر 3 قادر على المشي كل المسافات داخل البيت، بوجود ألم أسفل الظهر 4 قادر على المشي كل المسافات داخل البيت، بدون ألم ولكن الألم يكون بعد الانتهاء من المشي 5 قادر على المشي كل المسافات داخل البيت، ليس هنالك ألم خلال المشي ولا بعد الانتهاء من المشي
I3 – Walking outdoor without feeling pain in the lower back 0 Unable to initiate walking outdoors due to low back pain. 1 Pain* interrupts walking outdoors, unable to resume 2 Pain* interrupts walking outdoors, able to resume 3 pain* during walking outdoors, able to continue without interruption 4 pain* after completion of walking outdoors 5 Pain* free throughout walking outdoors, no pain* afterwards * Pain in the lower back	**I3 - المشي خارج البيت بدون ألم في أسفل الظهر** 0 غير قادر على البدء بالمشي خارج البيت بسبب ألم أسفل الظهر 1 ألم أسفل الظهر يقاطع المشي خارج البيت ولا أستطيع المواصلة 2 ألم أسفل الظهر يقاطع المشي خارج البيت ولكن أستطيع المواصلة 3 قادر على المشي خارج البيت بدون مقاطعة مع وجود الألم في أسفل الظهر 4 ليس هنالك ألم خلال المشي خارج البيت، الألم في أسفل الظهر يكون لاحقاً 5 قادر على المشي خارج البيت من دون ألم في أسفل الظهر، وليس هنالك ألم لاحقاً

I4 - Walk independently 0 Unable to walk due to low back pain 1 Walks with help from two bases of support (2 people) 2 Walks with help from one base of support (1 people) 3 Walks with the help of stick 4 Walks without support but with bent trunk 5 Walks independently, without help and with straight back	**I4 - المشي بدون مساعدة** 0 غير قادر على المشي 1 أمشي بمساعدة قاعدتين للدعم (شخصين). 2 أمشي بمساعدة قاعدة واحدة للدعم (شخص). 3 أمشي بمساعدة عكاز 4 أمشي بدون أي مساعدة ولكن بظهر غير معتدل 5 أمشي بشكل مستقل، بدون مساعدة وبظهر معتدل
J1 – Jogging required distance* without pain** 0 Pain in the lower back prevents jogging for a required distance* 1 Pain** interrupts jogging for a required distance*, unable to resume 2 Pain** interrupts jogging for a required distance*, able to resume 3 Feeling pain** during jogging for a required distance*, able to continue without interruption 4 Feeling pain** after completion of jogging for a required distance* 5 Pain* free throughout jogging for a required distance*, no pain afterwards * Specify in the notes ** Pain in the lower back	**J1 - هرولة المسافة المطلوبة من دون ألم** 0 غير قادر على هرولة المسافة المطلوبة* بدون ألم** في أسفل الظهر 1 الألم يقاطع هرولة المسافة المطلوبة*، مع عدم المقدرة على المتابعة 2 الألم يقاطع هرولة المسافة المطلوبة*، مع المقدرة على المتابعة 3 الشعور بالألم خلال هرولة المسافة المطلوبة، أستطيع المتابعة من غير مقاطعة 4 ليس هنالك ألم عند هرولة المسافة المطلوبة ولكن الألم في أسفل الظهر يكون بعد إكمال الهرولة 5 قادر على هرولة المسافة المطلوبة* بدون ألم، ليس هنالك ألم لاحقاً * يتم تحديده في صفحة الملاحظات
J2 – Runs in one direction on even ground without pain* 0 Pain* prevents running in one direction on even ground 1 Pain* interrupts running in one direction on even ground, unable to resume 2 Pain* interrupts running in one direction on even ground, able to resume 3 Pain* during running in one direction on even ground, able to continue without interruption 4 Pain* after completion of running in one direction on even ground 5 Pain* free throughout running in one direction on even ground, no pain afterwards * Pain in the lower back	**J2 - الركض في اتجاه واحد على أرض مستوية بدون ألم*** 0 الألم في أسفل الظهر يمنع القيام بالركض في اتجاه واحد على أرض مستوية 1 الألم في أسفل الظهر يقاطع الركض في اتجاه واحد على أرض مستوية مع عدم المقدرة على المتابعة 2 الألم في أسفل الظهر يقاطع الركض في اتجاه واحد على أرض مستوية مع المقدرة على المتابعة 3 الشعور بالألم في أسفل الظهر خلال الركض في اتجاه واحد على أرض مستوية، أستطيع المتابعة من غير مقاطعة 4 الشعور بالألم في أسفل الظهر بعد إكمال الركض في اتجاه واحد على أرض مستوية 5 **ليس** هنالك ألم في أسفل الظهر خلال القيام بالركض في اتجاه واحد على أرض مستوية وبعد الانتهاء منه
K1 – Using the stairs* • Unable to load body weight pain** free • Unable to go upstairs pain** free • Unable to go down-stairs pain** free • Unable to maintain balance due to pain** • Requires support to use stairs due to pain** 0 All of these problems exist 1 Four problems exist 2 Three problems exist 3 Two problems exist 4 One problem exists 5 None of these problems exist * Specify the number of steps in the notes ** Pain in the lower back	**K1 - استخدام الدرج* بدون ألم** * يتم تحديد عدد الدرجات المتفق عليها في صفحة الملاحظات • غير قادر على تحميل وزن الجسم بدون ألم • غير قادر على صعود الدرج بدون ألم • غير قادر على نزول الدرج بدون ألم • غير قادر على المحافظة على التوازن بسبب الألم • احتاج مساعدة عند استخدام الدرج بسبب الألم 0 **كل هذه المشاكل موجودة** 1 **وجود أربعة مشاكل** 2 **وجود ثلاثة مشاكل** 3 **وجود مشكلتين** 4 **وجود مشكلة واحدة** 5 **لا يوجد أي من هذه المشاكل**

K2 – Climbing one step 0 Unable to place foot on step 1 Able to transfer weight onto 1 foot, maintain body balance and place non weight bearing foot on step 2 Able to transfer weight onto foot placed on step above 3 Able to extend weight bearing hip and knee 4 Able to flex non weight bearing hip and knee 5 Able to place other foot on the next step above	**K2 - صعود درجة واحدة** 0 غير قادر على وضع القدم على الدرجة 1 قادر على نقل القدم على الدرجة وتحميل وزن الجسم على القدم الأخرى مع المحافظة على توازن الجسم 2 قادر على نقل وزن الجسم على القدم الموضوعة على الدرجة 3 قادر على فرد مفصلي الورك والركبة حاملة الوزن. 4 قادر على ثني مفصلي الورك والقدم غير حاملة الوزن 5 قادر على وضع القدم الأخرى على الدرجة العلوية التالية
K3 – Ascending the whole staircase* 0 Pain** prevents ascending the whole staircase 1 Pain** interrupts ascending the whole staircase, unable to resume 2 Pain** interrupts ascending the whole staircase, able to resume 3 Feeling pain in the lower back during ascending the whole staircase, able to continue without interruption 4 Feeling pain in the lower back after completion of ascending the whole staircase 5 Pain free throughout ascending the whole staircase, no pain afterwards * Specify in the notes ** Pain in the lower back	**K3 - صعود الدرج كاملاً** * يتم تحديد كم درجة في صفحة الملاحظات 0 الألم يمنع صعود الدرج 1 الألم يقاطع صعود الدرج ولا أستطيع المتابعة بدون مساعدة 2 الألم يقاطع صعود الدرج ولكنني أستطيع المتابعة بدون مساعدة 3 الألم موجود عند صعود الدرج ولكنني أستطيع المواصلة من غير مقاطعة 4 ليس هنالك ألم خلال صعود الدرج ولكن هنالك ألم يكون لاحقاً 5 ليس هنالك ألم عند صعود الدرج، ليس هنالك ألم لاحقاً
K4 – Descending one step 0 Unable to place foot on lower step due to pain 1 Able to transfer one foot on the lower step and loading body weight on the other leg 2 Able to flex hip, knee and ankle of rear weight bearing leg 3 Able to place non weight bearing foot onto the lower step 4 Able to transfer weight onto foot placed on the lower step 5 Able to place other foot onto the lower step	**K4 - نزول درجة واحدة** 0 غير قادر على وضع القدم على الدرجة السفلية بسبب الألم 1 قادر على نقل القدم على الدرجة السفلية مع تحميل الوزن على القدم الأخرى 2 قادر على ثني مفصلي الورك والركبة والكاحل للقدم حاملة الوزن 3 قادر على وضع القدم غير حاملة الوزن على الدرجة السفلية 4 قادر على نقل الوزن على القدم الموضوعة على الدرجة السفلية 5 قادر على وضع القدم الأخرى على الدرجة السفلية
K5 - Descending the whole staircase* 0 Pain** prevents descending the whole staircase 1 Pain** interrupts descending the whole staircase, unable to resume 2 Pain** interrupts descending the whole staircase, able to resume 3 Feeling pain in the lower back during descending the whole staircase, able to continue without interruption 4 Feeling pain in the lower back after completion of descending the whole staircase 5 Pain free throughout descending the whole staircase, no pain afterwards * Specify in the notes ** Pain in the lower back	**K5 - نزول الدرج كاملاً بدون ألم*** * يتم تحديد كم درجة في صفحة الملاحظات 0 الألم يمنع نزول الدرج 1 الألم يقاطع نزول الدرج ولا أستطيع المتابعة بدون مساعدة 2 الألم يقاطع نزول الدرج ولكنني أستطيع المتابعة بدون مساعدة 3 الألم موجود عند نزول الدرج ولكنني أستطيع المواصلة من غير مقاطعة 4 ليس هنالك ألم خلال نزول الدرج ولكن هنالك ألم يكون لاحقاً 5 ليس هنالك ألم عند نزول الدرج، ليس هنالك ألم لاحقاً

L1 – Lifting objects without pain*	**L1 - رفع الأجسام بدون ألم**
⓿ Unable to bend trunk, hips, and lower limb due to pain*	⓿ غير قادر على ثني الجذع، ومفصلي الورك والأطراف السفلية بسبب الألم
❶ Able to bend trunk, hips, and lower limb pain* free, but unable to lift (**Specify a small size object for lifting**) due to pain*	❶ قادر على ثني الجذع ومفصلي الورك والأطراف السفلية بدون ألم ولكن غير قادر على رفع **(حدد الجسم الأصغر للحمل)**
❷ Able to lift the (**Specify a small size object for lifting**), unable to continue due to pain*	❷ قادر على رفع **(حدد الجسم الأصغر للحمل)** ولكن لا أستطيع المواصلة بسبب الألم
❸ Able to lift (**Specify a small size object for lifting**), pain* free	❸ قادر على رفع **(حدد الجسم الأصغر للحمل)** بدون ألم
❹ Able to lift (**Specify a medium size object for lifting**), pain* free	❹ قادر على رفع **(حدد الجسم المتوسط للحمل)** بدون ألم
❺ Able to lift (**Specify a large size object for lifting**), pain* free	❺ قادر على رفع **(حدد الجسم الأكبر للحمل)** بدون ألم
* Pain in the lower back	
L2 – Carrying an object* for a certain distance*	**L2 - نقل جسم* مسافة محددة***
⓿ Pain* prevents carrying an object for a specified distance	* يتم تحديده في صفحة الملاحظات
❶ Pain* interrupts carrying an object for a specified distance, unable to resume	⓿ الألم يمنع نقل جسم مسافة محددة
❷ Pain* interrupts carrying an object for a specified distance, able to resume	❶ الألم يقاطع نقل جسم مسافة محددة ولا أستطيع المتابعة بدون مساعدة
❸ Feeling pain* during carrying an object for a specified distance, able to continue without interruption	❷ الألم يقاطع نقل جسم مسافة محددة ولكنني أستطيع المتابعة بدون مساعدة
❹ Feeling pain* after completion of carrying an object a specified distance	❸ الألم موجود عند نقل جسم مسافة محددة ولكنني أستطيع المواصلة من غير مقاطعة
❺ Pain* free throughout carrying an object for a specified distance, no pain* afterwards *	❹ ليس هنالك ألم خلال نقل جسم مسافة محددة ولكن هنالك ألم يكون لاحقاً
* Specify in the notes.	❺ ليس هنالك ألم عند نقل جسم مسافة محددة، ليس هنالك ألم لاحقاً
L3 – Lowering an object*	**L3 - إنزال جسم* محمول على الأرض من وضعية الوقوف**
⓿ Unable to lower a carried object from a standing position due to pain**	⓿ غير قادر على تنزيل الجسم المحمول من وضعية الوقوف بسبب ألألم في أسفل الظهر
❶ Able to bend trunk forwards and maintain carrying an object.	❶ قادر على ثني الجذع الى الأمام مع المحافظة على حمل الجسم
❷Pain** interrupts the ability to bend hips, knees and ankles, unable to continue	❷ الألم يقاطع القدرة على ثني مفصلي الورك والركبتين والكاحل، لا أستطيع المواصلة
❸ Pain** interrupts the ability to bend hips, knees and ankles, able to continue	❸ الألم يقاطع القدرة على ثني مفصلي الورك والركبتين والكاحل، لكن أستطيع المواصلة
❹ Pain* during lowering down a carried object from a standing position, able to continue without interruption	❹ الألم يكون عند إنزال جسم محمول على الأرض من وضعية الوقوف ولكن أستطيع المواصلة بدون مقاطعة
❺ Able to lower a carried object on the ground from a standing position, pain** free	❺ قادر على إنزال جسم محمول على الأرض من وضعية الوقوف وبدون ألم في أسفل الظهر
* Specify in the notes	
** Pain in the lower back	
M1 - Doing an activity* without feeling pain in the lower back	**M1 - القيام بنشاط* من غير ألم في أسفل ظهر**
* Specify in the notes	* يتم تحديده في صفحة الملاحظات
⓿ Pain in the lower back prevents a **named activity**	⓿ الألم في أسفل الظهر يمنع القيام ب **(النشاط المسمى)**
❶ Pain in the lower back interrupts a **named activity**, unable to resume	❶ الألم في أسفل الظهر يقاطع **(النشاط المسمى)** مع عدم المقدرة على المتابعة
❷ Pain in the lower back interrupts a **named activity**, able to resume	❷ الألم في أسفل الظهر يقاطع **(النشاط المسمى)** مع المقدرة على المتابعة
❸ pain in the lower back during a **named activity**, able to continue without interruption	❸ الشعور بالألم في أسفل الظهر خلال **(النشاط المسمى)**، أستطيع المتابعة من غير مقاطعة
❹ pain in the lower back after completion of a **named activity**	❹ الشعور بالألم في أسفل الظهر بعد إكمال **(النشاط المسمى)**
❺ Pain free throughout a **named activity**, no pain afterwards	❺ **ليس** هنالك ألم خلال القيام **(النشاط المسمى)** وبعد الانتهاء منه

Appendix P: The TELER LBP quiz-style questionnaire

Name:	Age:	Gender:	Social Status:
Occupation:	Date of the session: DD / MM / YYYY (Initial assessment – Follow up – Discharge)		
Diagnosis (Problem List):	Notes:		
	Warnings		

Do you have any problem in performing the following activities **due to your pain in the lower back?** Please place a mark (e.g. X) next to these affected activities.	No	Yes	Irrelevant to me	For physiotherapist use
1. Sleeping continuously				A1
2. Bed mobility				B1
3. Getting up from lying to sit on the edge of bed				B2
4. Getting up from lying to sit on bed (long sitting)				B3
5. Getting out of bed without help				C1
6. Standing straight up from sitting				D1
7. Sitting from standing				D2
8. Standing straight up from sitting on the floor				D3
9. Sitting for a long period of time				E1
10. Standing straight up for a long period of time				F1
11. Bending the trunk forward from standing				G1
12. Raising the trunk upward to the upright position from bending forward				G2
13. Squatting from standing straight up and maintain squatting				H1
14. Standing straight up from squatting and maintain standing				H2
15. Walking in general				I1
16. Walking inside house				I2
17. Walking outside house				I3
18. Walking without help				I4
19. Jogging				J1
20. Running in one direction on even ground				J2
21. Using the stairs in general				K1
22. Ascend of one step				K2
23. Ascend the whole staircase				K3
24. Descend of one step				K4
25. Descend the whole staircase				K5
26. Lifting an object upward				L1
27. Carrying an object and walking				L2
28. Lowering a carried object on the ground from standing				L3
Do you have any other activity other than listed above that is affected by low back pain?				M1

Appendix Q: The pre-testing copy of the TELER LBP questionnaire

Part 01

الاسم:	العمر:	الجنس:	الحالة الاجتماعية:
المهنة:	تاريخ الجلسة: (جلسة تقييم إبتدائية – جلسة متابعة – جلسة تقييم نهائية)		
التشخيص (المشكلة):	ملاحظات:		
	تحذيرات:		

هل لديك أية مشاكل بالقيام بالنشاطات التالية بسبب ألم أسفل الظهر؟ يرجى وضع علامة (X) بجانب كل مربع و عدم ترك أي نشاط فارغ بلا إجابة.	لا	نعم	ليس بمهم	لاستخدام الأخصائي
1. النوم بشكل متواصل				A1
2. الحركة في السرير				B1
3. النهوض من حالة الإستلقاء على الظهر (النوم على الظهر) للجلوس على طرف السرير				B2
4. النهوض من حالة الإستلقاء (النوم على الظهر) للجلوس على السرير مع فرد الرجلين على السرير				B3
5. الخروج من السرير بلا مساعدة				C1
6. الوقوف بإستقامة من وضعية الجلوس				D1
7. الجلوس من و ضعية الوقوف				D2
8. الوقوف بإستقامة من وضعية الجلوس على الأرض				D3
9. الجلوس لفترة زمنية طويلة				E1
10. الوقوف بإستقامة لفترة زمنية طويلة				F1
11. ثني الجذع للإمام من وضعية الوقوف				G1
12. رفع الجذع للأعلى للوقوف بإستقامة من وضعية الثني للأمام				G2
13. القرفصاء من وضعية الوقوف بإستقامة و المحافظة على القرفصاء				H1
14. الوقوف بإستقامة من وضعية القرفصاء و المحافظة على الوقوف				H2
15. المشي بشكل عام				I1
16. المشي داخل البيت				I2
17. المشي خارج البيت				I3
18. المشي بدون مساعدة				I4
19. الهرولة				J1
20. الركض بإتجاه واحد على أرض مستوية				J2
21. إستخدام السلالم بشكل عام				K1
22. صعود درجة واحدة				K2
23. صعود الدرج كاملاً				K3
24. نزول درجة واحدة				K4
25. نزول الدرج كاملاً				K5
26. رفع جسم الى الأعلى				L1
27. حمل جسم و المشي به				L2
28. إنزال جسم محمول الى الأسفل من وضعية الوقوف				L3
29. هل هنالك أية نشاطات أخرى غير مذكورة في القائمة أعلاه أثر عليها ألم أسفل الظهر بشكل سلبي؟				M1

Part 02

A1 - النوم بشكل متواصل بدون مقاطعة بسبب الألم في أسفل الظهر (و بدون أخذ المسكنات)

0 غير قادر على النوم بسبب الألم في أسفل الظهر
1 استيقظ من النوم بسبب الألم في أسفل الظهر، و بسببه غير قادر على العودة الى النوم
2 استيقظ من النوم بسبب الألم في أسفل الظهر، لكن قادر على العودة للنوم
3 الألم في أسفل الظهر موجود و لكنه لا يمنع و لا يقاطع النوم
4 ليس هنالك ألم في أسفل الظهر عند الخلود للنوم ولكن الألم عند الإنتهاء من النوم
5 نوم متواصل بدون ألم في أسفل الظهر و لا لاحقاً عند الإستيقاظ

ملاحظات:

B1 - الحركة في السرير (غير تصاعدي)

- قادر على ثني مفصلي الورك و الركبتين
- قادر على المحافظة على ثني مفصلي الورك و الركبتين
- قادر على رفع المؤخرة
- قادر على تحريك المؤخرة للجانب
- قادر على تحريك الكتفين و الرأس للجانب

0 **غير قادر على تحقيق أي منهم***
1 **قادر على تحقيق واحدة ***
2 **قادر على تحقيق اثنتين ***
3 **قادر على تحقيق ثلاثة ***
4 **قادر على تحقيق أربعة ***
5 **قادر على تحقيقهم كلهم**
*** بسبب ألم أسفل الظهر**

ملاحظات:

B2 - النهوض من الإستلقاء الى الجلوس على طرف السرير

0 لا استطيع الحركة في السرير بسبب الألم في أسفل الظهر
1 استطيع ثني الركبتين خلال الإستلقاء
2 استطيع رفع الجسم كجسر للتحرك الى الجانبين
3 استطيع الدوران الى النوم على الجانب (مع ثني الركبتين)
4 دفع الجسم للأعلى بالإستناد على الساعد
5 استطيع تحقيق الجلوس على طرف السرير (عن طريق إنزال القدمين الى الجانب و دفع الجسم للاعلى باليد)

ملاحظات:

B3 - النهوض من الإستلقاء للجلوس على السرير مع فرد الرجلين

0 غير قادر على الجلوس على السرير من وضعية الإستلقاء بسبب ألم أسفل الظهر
1 قادر على رفع و تدوير الرأس و الجذع العلوي من الجسم
2 قادر على تحريك اليد تحت الجسم و تدوير الجزء العلوي من الجذع
3 قادر على فرد اليد الداعمة للجسم، تدوير الجزء السفلي من الجذع و رفع القدمين على السرير
4 قادر على تحميل الوزن على المؤخرة.
5 قادر على الجلوس و رفع الأيدي عن السرير

ملاحظات:

C1 - الخروج من السرير بدون مساعدة

0 غير قادر على الخروج من السرير بسبب ألم في أسفل الظهر
1 قادر على تحقيق وضعية الجلوس على طرف السرير بمساعدة
2 قادر على تحقيق وضعية الجلوس و بدون مساعدة
3 قادر على التنقل من الجلوس الى الوقوف و بدون مساعدة
4 المحافظة على وضعية الوقوف بدون مساعدة
5 المشي بعيداً عن السرير من دون مساعدة

ملاحظات:

D1 - الوقوف باستقامة من الجلوس

0 غير قادر على الوقوف من الجلوس بسبب ألم أسفل الظهر
1 قادر على التحرك للأمام من فوق الكرسي أو السرير
2 قادر على حمل وزن الجسم على الأقدام
3 قادر على رفع المؤخرة من على الكرسي أو السرير
4 قادر على فرد أي من الحوض أو الركبتين أو الجذع بشكل كامل (ليس جميعهم).
5 قادر على فرد الحوض و الركبتين و الجذع بشكل كامل لتحقيق وضعية الوقوف باستقامة

ملاحظات:

D2 - الجلوس من الوقوف

0 الجلوس من دون تحكم بسبب ألم أسفل الظهر
1 إحضار وزن الجسم الى الأمام في وضعية الوقوف
2 ثني مفصلي الورك و الركبتين
3 إستخدام اليدين للمساعدة على الجلوس
4 انزال الجسم بشكل سلس الى الكرسي أو السرير
5 الجلوس بشكل كامل و بدون ألم

ملاحظات:

D3 - الوقوف باستقامة من وضعية الجلوس على الأرض

0 عدم المقدرة على نقل الوزن بوضعية الجلوس الجانبي بسبب ألم أسفل الظهر.
1 قادر على نقل وزن الجسم الى وضعية الجلوس الجانبي
2 قادر على نقل الوزن الى الأمام فوق الركبتين (لتحقيق وضعية الوقوف على الركب)
3 قادر على فرد مفصلي الورك الى الأعلى لأخذ وضعية الوقوف على الركب و من ثم تحريك القدم غير محملة الوزن على الأرض
4 قادر على تحميل الوزن على القدم الأمامية و فرد مفصلي الورك و الركبة
5 قادر على الوقوف باستقامة

ملاحظات:

E1 - الجلوس لمدة (حدد المدة الزمنية) بدون ألم في أسفل الظهر

0 غير قادر على الجلوس لمدة **(حدد المدة الزمنية)** بسبب الألم في أسفل الظهر
1 الألم يقاطع الجلوس لمدة **(حدد المدة الزمنية)**، غير قادر على المتابعة
2 الالم يقاطع الجلوس لمدة **(حدد المدة الزمنية)** ولكنني قادر على المواصلة
3 قادر على الجلوس من دون ألم لمدة **(حدد المدة الزمنية)** ولكن هنالك ألم يكون لاحقاً
4 قادر على الجلوس من دون ألم لمدة **(حدد المدة الزمنية)** ولكن هنالك عدم ارتياح يكون لاحقاً
5 قادر على الجلوس لمدة **(حدد المدة الزمنية)** من دون مشاكل

ملاحظات:

F1 - الوقوف بإستقامة لمدة (حدد المدة الزمنية) بدون ألم في أسفل الظهر

0 غير قادر على الوقوف بإستقامة لمدة **(حدد المدة الزمنية)** بسبب الألم في أسفل الظهر
1 الألم يقاطع الوقوف بإستقامة لمدة **(حدد المدة الزمنية)** ، غير قادر على المتابعة
2 الألم يقاطع الوقوف بإستقامة لمدة **(حدد المدة الزمنية)** ولكنني قادر على المواصلة
3 قادر على الوقوف بإستقامة من غير ألم لمدة **(حدد المدة الزمنية)** ولكن هنالك ألم يكون لاحقاً
4 قادر على الوقوف بإستقامة من غير ألم لمدة **(حدد المدة الزمنية)** ولكن هنالك عدم ارتياح يكون لاحقاً
5 قادر على الوقوف بإستقامة لمدة **(حدد المدة الزمنية)** من دون مشاكل

ملاحظات:

G1 - ثني الجذع الى الامام من دون الشعور بالألم في أسفل الظهر

0 غير قادر على ثني الجذع للأمام بسبب الألم في أسفل الظهر
1 الالم في أسفل الظهر يكون عند البدء بثني الجذع و لكن ليس هنالك ألم في وضعية الوقوف
2 الشعور بالألم في أسفل الظهر عند ثني الجذع (قبل الوصول لمنتصف مدى الحركة)، و لكن لا أستطيع المواصلة
3 الشعور بالألم في أسفل الظهر عند ثني الجذع و أستطيع المواصلة و لكن ليس بشكل كامل
4 الشعور بالألم في أسفل الظهر عند ثني الجذع بشكل كامل
5 ثني الجذع بشكل كامل للأمام بدون ألم في أسفل الظهر

ملاحظات:

G2 - رفع الجذع الى الأعلى من وضعية الثني للأمام من دون الشعور بالألم في أسفل الظهر

0 غير قادر على رفع الجذع للأعلى بسبب الألم في أسفل الظهر
1 الالم يكون عند البدء برفع الجذع للأعلى و لكن ليس هنالك ألم في وضعية ثني الجذع للأمام
2 الشعور بالألم في أسفل الظهر عند رفع الجذع للأعلى (قبل الوصول لمنتصف مدى الحركة)، و لكن ليس بشكل كامل
3 الشعور بالألم في أسفل الظهر عند رفع الجذع للأعلى و أستطيع المواصلة و لكن ليس بشكل كامل
4 الشعور بالألم في أسفل الظهر عند الوقوف بإستقامة
5 رفع الجذع للأعلى للوصول لوضعية الوقوف بإستقامة بدون ألم في أسفل الظهر

ملاحظات:

H1 - القرفصاء من الوقوف بإستقامة و المحافظة عليها بدون ألم

0 غير قادر على تحقيق وضعية القرفصاء بسبب ألم أسفل الظهر
1 قادر على ثني الجذع الى الأمام
2 الألم يقاطع القدرة على ثني مفصلي الورك و الركبتين و الكاحل ، لا أستطيع المواصلة
3 الألم يقاطع القدرة على ثني مفصلي الورك و الركبتين و الكاحل ، لكن أستطيع المواصلة
4 قادر على تحقيق القرفصاء و لكن لا أستطيع المحافظة عليها بسبب ألم أسفل الظهر
5 قادر على المحافظة على وضعية القرفصاء و بدون ألم في أسفل الظهر

ملاحظات:

H2 - الوقوف بإستقامة من وضعية القرفصاء

0 غير قادر على الوقوف بإستقامة من وضعية القرفصاء بسبب ألم أسفل الظهر
1 الألم يقاطع القدرة على فرد مفصلي الورك و الركبتين و الكاحل ، لا أستطيع المواصلة
2 الألم يقاطع القدرة على فرد مفصلي الورك و الركبتين و الكاحل ، لكن أستطيع المواصلة
3 قادر على رفع اسفل الظهر الى الاعلى
4 قادر على رفع أعلى الظهر للوصول الى الإستقامة بالوقوف
5 الوقوف بإستقامة من وضعية القرفصاء بدون ألم في أسفل الظهر

ملاحظات:

I1 - أداء وظيفة المشي

- المشي في عدة إتجاهات
- تغيير الإتجاهات
- المشي على الأسطح المختلفة في الحياة اليومية
- قادر على التعامل مع المنحدرات
- قادر على التعامل مع الأماكن الضيقة

0 **غير قادر على عمل أي منهم***
1 **قادر على عمل واحدة***
2 **قادر على عمل اثنتين***
3 **قادر على عمل ثلاث***
4 **قادر على عمل أربعة***
5 **قادر على عملهم كلهم**
*** بسبب ألم أسفل الظهر**

ملاحظات:

I2 - مشي مسافة داخل البيت بدون ألم في أسفل الظهر

0 غير قادر على المشي الى باب الغرفة بدون الإحساس بالألم في أسفل الظهر (خلال او بعد).
1 قادر على المشي داخل الغرفة من دون ألم في أسفل الظهر
2 قادر على المشي الى الغرفة المجاورة من دون الشعور بألم في أسفل الظهر
3 قادر على المشي كل المسافات داخل البيت ، بوجود ألم أسفل الظهر
4 قادر على المشي كل المسافات داخل البيت ، بدون ألم و لكن الألم يكون بعد الإنتهاء من المشي
5 قادر على المشي كل المسافات داخل البيت ، ليس هنالك ألم خلال المشي و لا بعد الإنتهاء من المشي

ملاحظات:

I3 - المشي خارج البيت بدون ألم في أسفل الظهر

0 غير قادر على البدأ بالمشي خارج البيت بسبب ألم أسفل الظهر
1 ألم أسفل الظهر يقاطع المشي خارج البيت و لا أستطيع المواصلة
2 ألم أسفل الظهر يقاطع المشي خارج البيت و لكن أستطيع المواصلة
3 قادر على المشي خارج البيت بدون مقاطعة مع وجود الألم في أسفل الظهر
4 ليس هنالك ألم خلال المشي خارج البيت ، الألم في أسفل الظهر يكون لاحقاً
5 قادر على المشي خارج البيت من دون ألم في أسفل الظهر، و ليس هنالك ألم لاحقاً

ملاحظات:

I4 - المشي بدون مساعدة

0 غير قادر على المشي
1 أمشي بمساعدة قاعدتين للدعم (شخصين).
2 أمشي بمساعدة قاعدة واحدة للدعم (شخص).
3 أمشي بمساعدة عكاز
4 أمشي بدون أي مساعدة و لكن بظهر غير معتدل
5 أمشي بشكل مستقل، بدون مساعدة و بظهر معتدل

ملاحظات:

J1 - هرولة المسافة المطلوبة من دون ألم

0 غير قادر على هرولة المسافة المطلوبة* بدون ألم** في أسفل الظهر
1 الألم يقاطع هرولة المسافة المطلوبة*، مع عدم المقدرة على المتابعة
2 الألم يقاطع هرولة المسافة المطلوبة*، مع المقدرة على المتابعة
3 الشعور بالألم خلال هرولة المسافة المطلوبة ، أستطيع المتابعة من غير مقاطعة
4 ليس هنالك ألم عند هرولة المسافة اللمطلوبة و لكن الألم في أسفل الظهر يكون بعد إكمال الهرولة
5 قادر على هرولة المسافة المطلوبة* بدون ألم، ليس هنالك ألم لاحقاً
* يتم تحديده في صفحة الملاحظات

ملاحظات:

J2 - الركض في اتجاه واحد على أرض مستوية بدون ألم*

0 الألم في أسفل الظهر يمنع القيام بالركض في اتجاه واحد على أرض مستوية
1 الألم في أسفل الظهر يقاطع الركض في اتجاه واحد على أرض مستوية مع عدم المقدرة على المتابعة
2 الألم في أسفل الظهر يقاطع الركض في اتجاه واحد على أرض مستوية مع المقدرة على المتابعة
3 الشعور بالألم في أسفل الظهر خلال الركض في اتجاه واحد على أرض مستوية، استطيع المتابعة من غير مقاطعة
4 الشعور بالألم في أسفل الظهر بعد إكمال الركض في اتجاه واحد على أرض مستوية
5 ليس هنالك ألم في أسفل الظهر خلال القيام بالركض في اتجاه واحد على أرض مستوية و بعد الإنتهاء منه

ملاحظات:

K1 - استخدام الدرج* بدون ألم

* يتم تحديد عدد الدرجات المتفق عليها في صفحة الملاحظات
- غير قادر على تحميل وزن الجسم بدون ألم
- غير قادر على صعود الدرج بدون ألم
- غير قادر على نزول الدرج بدون ألم
- غير قادر على المحافظة على التوازن بسبب الألم
- احتاج مساعدة عند استخدام الدرج بسبب الألم

0 **كل هذه المشاكل موجودة**
1 **وجود أربعة مشاكل**
2 **وجود ثلاثة مشاكل**
3 **وجود مشكلتين**
4 **وجود مشكلة واحدة**
5 **لا يوجد أي من هذه المشاكل**

ملاحظات:

K2 - صعود درجة واحدة

0 غير قادر على وضع القدم على الدرجة
1 قادر على نقل القدم على الدرجة و تحميل وزن الجسم على القدم الأخرى مع المحافظة على توازن الجسم
2 قادر على نقل وزن الجسم على القدم الموضوعة على الدرجة
3 قادر على فرد مفصلي الورك و الركبة حاملة الوزن .
4 قادر على ثني مفصلي الورك و القدم غير حاملة الوزن
5 قادر على وضع القدم الأخرى على الدرجة العلوية التالية

ملاحظات:

K3 - صعود الدرج كاملاً

* يتم تحديد كم درجة في صفحة الملاحظات
0 الألم يمنع صعود الدرج
1 الألم يقاطع صعود الدرج و لا أستطيع المتابعة بدون مساعدة
2 الألم يقاطع صعود الدرج و لكنني أستطيع المتابعة بدون مساعدة
3 الألم موجود عند صعود الدرج ولكنني أستطيع المواصلة من غير مقاطعة
4 ليس هنالك ألم خلال صعود الدرج و لكن هنالك ألم يكون لاحقاً
5 ليس هنالك ألم عند صعود الدرج، ليس هنالك ألم لاحقاً

ملاحظات:

K4 - نزول درجة واحدة

0 غير قادر على وضع القدم على الدرجة السفلية بسبب الألم
1 قادر على نقل القدم على الدرجة السفلية مع تحميل الوزن على القدم الأخرى
2 قادر على ثني مفصلي الورك و الركبة و الكاحل للقدم حاملة الوزن
3 قادر على وضع القدم غير حاملة الوزن على الدرجة السفلية
4 قادر على نقل الوزن على القدم الموضوعة على الدرجة السفلية
5 قادر على وضع القدم الأخرى على الدرجة السفلية

ملاحظات:

K5 - نزول الدرج كاملاً بدون ألم*

* يتم تحديد كم درجة في صفحة الملاحظات

0 الألم يمنع نزول الدرج
1 الألم يقاطع نزول الدرج و لا أستطيع المتابعة بدون مساعدة
2 الألم يقاطع نزول الدرج و لكنني أستطيع المتابعة بدون مساعدة
3 الألم موجود عند نزول الدرج ولكنني أستطيع المواصلة من غير مقاطعة
4 ليس هنالك ألم خلال نزول الدرج و لكن هنالك ألم يكون لاحقاً
5 ليس هنالك ألم عند نزول الدرج، ليس هنالك ألم لاحقاً

ملاحظات:

L1 - رفع الأجسام بدون ألم

0 غير قادر على ثني الجذع , و مفصلي الورك و الأطراف السفلية بسبب الألم
1 قادر على ثني الجذع و مفصلي الورك و الأطراف السفلية بدون ألم و لكن غير قادر على رفع **(حدد الجسم الأصغر للحمل)**
2 قادر على رفع **(حدد الجسم الأصغر للحمل)** ولكن لا استطيع المواصلة بسبب الألم
3 قادر على رفع **(حدد الجسم الأصغر للحمل)** بدون ألم
4 قادر على رفع **(حدد الجسم المتوسط للحمل)** بدون ألم
5 قادر على رفع **(حدد الجسم الأكبر للحمل)** بدون ألم

ملاحظات:

L2 - نقل جسم* مسافة محددة*

* يتم تحديده في صفحة الملاحظات

0 الألم يمنع نقل جسم مسافة محددة
1 الألم يقاطع نقل جسم مسافة محددة و لا أستطيع المتابعة بدون مساعدة
2 الألم يقاطع نقل جسم مسافة محددة و لكنني أستطيع المتابعة بدون مساعدة
3 الألم موجود عند نقل جسم مسافة محددة ولكنني أستطيع المواصلة من غير مقاطعة
4 ليس هنالك ألم خلال نقل جسم مسافة محددة و لكن هنالك ألم يكون لاحقاً
5 ليس هنالك ألم عند نقل جسم مسافة محددة، ليس هنالك ألم لاحقاً

ملاحظات:

L3 - إنزال جسم* محمول على الأرض من وضعية الوقوف

0 غير قادر على تنزيل الجسم المحمول من وضعية الوقوف بسبب ألألم في أسفل الظهر
1 قادر على ثني الجذع الى الأمام مع المحافظة على حمل الجسم
2 الألم يقاطع القدرة على ثني مفصلي الورك و الركبتين و الكاحل ، لا أستطيع المواصلة
3 الألم يقاطع القدرة على ثني مفصلي الورك و الركبتين و الكاحل ، لكن أستطيع المواصلة
4 الألم يكون عند إنزال جسم محمول على الأرض من وضعية الوقوف و لكن أستطيع المواصلة بدون مقاطعة
5 قادر على إنزال جسم محمول على الأرض من وضعية الوقوف و بدون ألم في أسفل الظهر

ملاحظات:

M1 - القيام بنشاط* من غير ألم في أسفل ظهر

* يتم تحديده في صفحة الملاحظات

0 الألم في أسفل الظهر يمنع القيام ب **(النشاط المسمى)**
1 الألم في أسفل الظهر يقاطع **(النشاط المسمى)** مع عدم المقدرة على المتابعة
2 الألم في أسفل الظهر يقاطع **(النشاط المسمى)** مع المقدرة على المتابعة
3 الشعور بالألم في أسفل الظهر خلال **(النشاط المسمى)**، استطيع المتابعة من غير مقاطعة
4 الشعور بالألم في أسفل الظهر بعد إكمال **(النشاط المسمى)**
5 ليس هنالك ألم خلال القيام **(النشاط المسمى)** و بعد الإنتهاء منه

ملاحظات:

TELER® **Part 03**

Physiotherapy

أسم المريض:

2014

Physiotherapy Management Plan		DD/MM	DD/MM	DD/MM	DD/MM	DD/MM	DD/MM
Assessment							
Education							
Referrals:							
Physiotherapy Interventions	1.						
	2.						
	3.						
	4.						
	5.						
	6.						
	7.						
	8.						
	9.						
	10.						
Medications:							
Performance Record							
Indicators							
Number of	0 codes						
	1 codes						
	2 codes						
	3 codes						
	4 codes						
	5 codes						

Part 04

Clinical notes

أسم المريض:

Past medical history --- --- --- --- --- --- --- --- --- --- **Self-management plan** --- --- --- --- --- --- --- --- --- ---	**Indicators ( ) didn't change within the last few sessions because:** --- --- --- **Indicators ( ) didn't change within the last few sessions because:** --- --- --- **Indicators ( ) didn't change within the last few sessions because:** --- --- --- **Indicators ( ) didn't change within the last few sessions because:** --- --- --- **Others:** --- --- --- ---

مقياس لمشاكل الم أسفل الظهر **Part 05**

هذا الاستبيان يبحث بمدى تأثير ألم اسفل الظهر على حياتك اليومية .قد يجد الأشخاص الذين يعانون ألم الظهر صعوبة بإداء بعض النشاطات اليومية .نريد أن نعرف ما إذا كنت تواجه صعوبة في اداء إي من النشاطات المذكورة ادناه بسبب ألم ظهرك.

يرجى منك ملاحظة أن كل ما تقوم بمناقشته او طرحه أو الاجابة عنه في هذا الاستبيان سيبقى في سرية تامة ، لك الحق بعدم المشاركة بالدراسة في اي وقت . رجاءاً اذا اردت طرح اي اسئلة تتعلق بالدراسة فنحن أكثر من سعيدين للأجابة عن أسئلتك مع جزيل الشكر.

لكل واحد من هذه النشاطات يوجد مقياس يتراوح من (ليس صعبا على الاطلاق)الى (غير قادر على عمله).
من فضلك أجب عن جميع الأسئلة أدناه و اختر إجابة واحدة فقط بوضع علامة (X) بالمربع المخصص لكل نشاط و التي تمثل أفضل وصف لوضعك الحالي.

الإسم: .....

التاريخ: .....

بسبب مشاكل الظهر التي تعاني منها، ما مدى الصعوبة التي تجدها اليوم في عمل التالي :	**ليس صعباً على الإطلاق**	**شئ بسيط من الصعوبة**	**صعبة نوعا ما**	**صعوبة متوسطة**	**صعبة جداً**	**غير قادر على القيام به**
النهوض من الفراش (السرير)؟						
النوم ليلاً (بدون تقطع) ؟						
التقلب أثناء النوم؟						
الجلوس لفترة في السيارة؟؟						
الوقوف لمدة *20* الى *30* دقيقة؟						
الجلوس على الكرسي لعدة ساعات؟						
صعود الدرج (وحدة من الدرج)؟						
السير مسافة عدة أبنية (شارع في الحي)؟						
المشي عدة كيلو مترات (مسافة طويلة)؟						
الوصول الى الأرفف المرتفعة؟						
رمي الكرة؟						
الركض مسافة قصيرة؟						
إخراج الطعام من الثلاجة؟						
ترتيب الفراش (السرير)؟						
إرتداء الجوارب العادية او الطويلة (الكيلون)؟						
الإنحناء لتنظيف حوض الإستحمام(البانيو)؟						
تحريك الكرسي؟						
دفع او سحب الأبواب الثقيلة؟						
حمل كيسين من البقالة؟						
رفع و حمل حقيبة ثقيلة؟						

شكرا لك جزيل الشكر على المشاركة في هذه الدراسة

Appendix R: Spine Care Jordan Centre

مركز سباين كير
Spine Care Center
لعلاج ديسك الظهر والرقبة بدون جراحة
Non-Surgical Lumbar and Cervical Disc Treatment

Date : 22nd December 2013 No: 399/2014

Subject : Validation of TELER physical functioning indicators by experts

Dear Professor Mawson,

Kindly note that ***Mr. Thamer Altaim*** presented to us his research concerning spinal problems which he is currently completing at the university of Sheffield (Sheffield, UK), and we are delighted to inform you that we have accepted to be one of the sites that he will be conducting his research (titled : The validation of the TELER physical functioning indicators for low back pain).

Our center (***Spine Care Jordan Center***) located 38 Ibn Khaldoun st. Jabal Amman, Amman Jordan is a specialized center for treating musculoskeletal spinal problems including low back and cervical pains. We have on staff five specialized manual physiotherapists who have advanced training in treating and management of low back pains and they are certified in international courses such: McKenzie, Mulligan, Neurodynamics, Myofascial release and other manual therapy techniques.

We would also appreciate if we can receive an official letter from your respected department related to this research and that ***Mr. Thamer Altaim*** is conducting this research as part of his PhD program in your university.

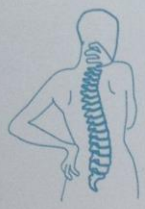
Sincerely yours,

Mohamed ALNabulsi

Center Director

Spine Care Jordan Center
Email : mnabulsi@spinecarejordan.com

Cell : +962777730004



مركز سباين كير
Spine Care Center
لعلاج ديسك الظهر والرقبة بدون جراحة
Non-Surgical Lumbar and Cervical Disc Treatment

Date : 16 Feb 2014 No: 400/2014

Subject : Clincical testing of TELER physical functioning indicators

Dear Professor Mawson,

Mr. Altaim as part of his research at our clinic that he is conducting for his PhD stud y proposed to us to use TELER physical functioning indicators as a tool for measuring change in low back pain patients.

Prior to using these indicators ***Mr.Altaim*** conducted for our physiotherapy staff several awareness seminars in which he explained that use of these indicators followed by specialized training on how to use these indicators in our clinical settings. This included a seminar in which ***Dr. Rasha Okasheh*** from the University of Jordan who ***Mr. Altaim*** presented as his local advisor.

Our staff had also some discussions with ***Mr. Altaim*** about some changes that we proposed to these indicators which maybe more suitable for our local population, habits and their lifestyle. These discussions proved very beneficial for our staff and the way we assess our patients and follow their progress.

We would like to note that this proposed approach is viewed from our side as a real added value and a better way to service our patients and pin point their problems which ultimately leads to higher satisfaction for our patients.

Sincerely yours,

Mohamed ALNabulsi

Center Director

Spine Care Jordan Center
Email: mnabulsi@spinecarejordan.com

Cell: +962777730004

Appendix S: Consent form and information sheet of clinical testing study

The University Of Sheffield.

Information sheets and consent forms

Participant information sheet (Individuals with low back pain)

Study title	**Clinical testing of TELER physical functioning indicator for use in musculoskeletal rehabilitation for people with low back pain**
Principal researcher	Thamer Ahmad Altaim
Telephone number	+ 962 (0) 7 85-818-800

Study Sponsor: The University of Sheffield, United Kingdom.

We would like to invite you to take part in our research study. Please, before you decide we would like you to understand the purpose of this research and what it would request you to be involved-in. Ask us if there is anything that is not clear.

Participant name:

Date:

You will be given a copy of this information sheet to keep for your own record.

1. What is the purpose of this study?

The purpose of this research is to examine the measurement properties of a number of TELER physical functioning indicators designed to trace changes in functions for individuals with LBP.
TELER is a scientific method for measuring changes in patients' health status using specific questions that is tailored to the condition under examination.

2. Why I have been invited?

You have been invited because your doctor has referred you to physiotherapy for your low back pain problem.

3. Do I have to take part?

Your decision to take part in this study is entirely voluntary. You may refuse to participate or you can withdraw from the study at any time and without any given reasons. Your refusal to participate or desire to withdraw would not influence the standard of care you will receive.

4. What will happen to me if I take part?

If you decide to participate in the study, you will be required to come five minutes earlier to your physiotherapy session and fill up a questionnaire that help us to understand how low back pain affect you.

5. Expenses and payment

You will not be paid for taking part in this study. We will be grateful if you decided to participate in this study.

6. What do I have to do?

If you agree to take part in the study, we will ask you to come 5 minutes earlier to your physiotherapy session. Your physiotherapist will give you a questionnaire and ask you few questions that examine how low back pain affects you. The measurement of your functional status will be repeated at the beginning of each physiotherapy session.

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

Apart from taking 5 minutes of your time, there are no risks in taking part in this study.

8. What are the possible benefits of taking part?

There are no personal benefits to you if you decided to take part in this study. However, the information extracted from this part of the study will help us in the future to improve our understanding and knowledge about low back pain. Taking part in this study could help your physiotherapist to take decisions based on the measurement of your functional status.

9. What if there is a problem or I want to complain?

If you have any queries or question please contact:
The researcher: Thamer Altaim (See point 14)
The director of studies: Prof. Sue Mawson
Email: s.mawson@sheffield.ac.uk
University of Sheffield registrar, ethics administrator: Kirsty Woodhead
Email: k.woodhead@sheffield.ac.uk

10. Will my decision to take part in this study be kept confidential?

All information that is collected / recorded about you during the study will be kept safe and secure. Electronic data will be kept on a secured and encrypted laptop. Recoded data will be kept in a secured locker. The documents relating to the administration of this research, such as the consent form you sign to take part in this study, will be kept in a folder called a site file or project file. This is locked away securely. The folder might be checked by people in authority who want to make sure that researchers are following the correct procedures. These people will not pass your details to anyone else. The documents will be destroyed five years after the end of the study.

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

The results of this study will be discussed with the supervisory team of this research programme anonymously. It is anticipated that the results will be published in a peer reviewed journal. However, those who are interested in study results will be sent a newsletter that shows these results.

12. Who is sponsoring the study?

The sponsor of this study is the University of Sheffield, United Kingdom.

13. Who has reviewed this study?

This study is approved by Sheffield Hallam University, the Ministry of Health in Jordan and the Jordanian University of Science and Technology Research Ethics Committees. These committees are approved by the University of Sheffield research ethics committee and are equivalent to it. These committees are run by these organisations but its members are not connected to the research they examine. These Research Ethics Committees have reviewed this study and given a favourable opinion.

14. Further information and contact details

Please contact the main researcher:
Thamer Ahmad Altaim
Email address: t.altaim@sheffield.ac.uk
Phone number: +962-7-85-818-800

Participant consent form

Study title:	**Clinical testing of TELER physical functioning indicator for use in musculoskeletal rehabilitation for people with low back pain**
Principal researcher	Thamer Ahmad Altaim
Telephone number	+ 962 (0) 7 85-818-800

Participant name:

	Please read the following statements and put your initials in the box to show that you have read and understood them and that you agree with them	**Please initial each box**
1	I confirm that I have read and understood the information sheet dated (/ /) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
2	I understand that my involvement in this study is voluntary and that I am free to withdraw at any time, without give any reason.	
3	I understand that relevant sections of my notes and data collected during the study may be looked at by the supervisory team, responsible individuals from the Sponsor, the Research Ethics Committee, where it is relevant to this research. I give permission for these individuals to have access to my data.	
4	I understand that data gathered could be used in future research related to this study.	
5	I agree to take part in this study	

To be filled in by the participant

I agree to take part in the above study

Your name	Date	Signature

To be filled in by the person obtaining consent

I confirm that I have explained the nature, purposes and possible effects of this research study to the person whose name is printed above.

Name of investigator	Date	Signature

Filing instructions

1 copy to the participant
1 original in the Project or Site file
1 copy in the medical notes (if applicable)

Thank you for your participation on this study, your help is much appreciated.

The University Of Sheffield.

Participant information sheet (Physiotherapist)

Study title	**Clinical testing of TELER physical functioning indicator for use in musculoskeletal rehabilitation for people with low back pain**
Principal researcher	Thamer Ahmad Altaim
Telephone number	+ 962 (0) 7 85-818-800

Study Sponsor: The University of Sheffield, United Kingdom.

We would like to invite you to take part in our research study. Please, before you decide we would like you to understand the purpose of this research and what it would request you to be involved-in. Please, ask us if there is anything that is not clear.

Participant name:	
Date:	

You will be given a copy of this information sheet to keep for your own record.

1. What is the purpose of this study?
The purpose of this research is to measure the functional status of individuals with low back pain (LBP) before and during physiotherapy sessions. A set of TELER physical functioning indicators will be used to measure LBP patients' functional status.
TELER is a scientific method for measuring changes in patients' health status using specific questions that is tailored to the condition under examination.

2. Why have I been invited?
You have been invited because the Jordanian society of physiotherapy recommended your name for the purpose of this study. We are recruiting experts in the field of musculoskeletal rehabilitation who have extensive experience in the management of low back pain.

3. Do I have to take part?
Your decision to take part in this study is entirely voluntary. You may refuse to participate or you can withdraw from the study at any time and without given reason.

4. What will happen to me if I take part?
If you decide to participate in the study, you will be asked to examine the functional status of individuals with low back pain using the TELER indicators and a back-specific disability scale. The measurement will take place at the beginning of each physiotherapy session.

5. Expenses and payment
Please note that you will not be paid for taking part in this study.

6. What are the possible disadvantages and risks of taking part?
There are no disadvantages or risks in taking part in this study.

7. What are the possible benefits of taking part?
There are no clinical / personal benefits to you if you decided to take part in this study. However, the information extracted from this part of the study will help us in the future to improve our understanding and knowledge about low back pain.

8. What if there is a problem or I want to complain?
If you have any queries or question please contact:
The researcher: Thamer Altaim (See point 14)
The director of studies: Prof. Sue Mawson
Email: s.mawson@sheffield.ac.uk
University of Sheffield registrar, ethics administrator: Kirsty Woodhead
Email: k.woodhead@sheffield.ac.uk

9. Will my decision to take part in this study be kept confidential?
All information that is collected / recorded about you during the study will be kept safe and secure. Electronic data will be kept on a secured and encrypted laptop. Recoded data will be kept in a secured locker. The documents relating to the administration of this research, such as the consent form you sign to take part in this study, will be kept in a folder called a site file or project file. This is locked away securely. The folder might be checked by people in authority who want to make sure that researchers are following the correct procedures. These people will not pass your details to anyone else. The documents will be destroyed five years after the end of the study.

10. What will happen to the results of the research study?
The results of this study will be discussed with the supervisory team of this research programme anonymously. It is anticipated that the results will be published in a peer reviewed journal. However, those who are interested on study results will be sent a newsletter that shows these results.

11. Who is sponsoring the study?
The sponsor of this study is the University of Sheffield, United Kingdom.

12. Who has reviewed this study?
This study is approved by Sheffield Hallam University, the Ministry of Health in Jordan and the Jordanian University of Science and Technology Research Ethics Committees. These committees are approved by the University of Sheffield research ethics committee and are equivalent to it. These committees are run by these organisations but its members are not connected to the research they examine. These Research Ethics Committees have reviewed this study and given a favourable opinion.

13. Further information and contact details
Please contact the main researcher:
Thamer Ahmad Altaim
Email address: t.altaim@sheffield.ac.uk
Phone number: +962-7-85-818-800

Participant consent form

Study title:	**Clinical testing of TELER physical functioning indicator for use in musculoskeletal rehabilitation for people with low back pain**
Principal researcher	Thamer Ahmad Altaim
Telephone number	+ 962 (0) 7 85-818-800

Participant name:	

	Please read the following statements and put your initials in the box to show that you have read and understood them and that you agree with them	**Please initial each box**
1	I confirm that I have read and understood the information sheet dated (/ /) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
2	I understand that my involvement in this study is voluntary and that I am free to withdraw at any time, without give any reason.	
3	I understand that relevant sections of my notes and data collected during the study may be looked at by the supervisory team, responsible individuals from the Sponsor, the Research Ethics Committee, where it is relevant to this research. I give permission for these individuals to have access to my data.	
4	I understand that data gathered could be used in future research related to this study.	
5	I agree to take part in this study	

To be filled in by the participant (physiotherapist)

I agree to take part in the above study

Your name	Date	Signature

To be filled in by the person obtaining consent

I confirm that I have explained the nature, purposes and possible effects of this research study to the person whose name is printed above.

Name of investigator	Date	Signature

Filing instructions

1 copy to the participant
1 original in the Project or Site file
1 copy in the medical notes (if applicable)

Thank you for your participation on this study, your help is much appreciated.

Appendix T: An example of a data collection form and instruments used in the Jordanian physiotherapy clinics involved in this research

(نموذج الاستشارة الطبية)

Patient Information Form

Date: [redacted] / 4 / 2014

Patient's Name(الاسم) [redacted]

Age(العمر):[redacted]

Address(العنوان):[redacted]

Gender(الجنس): □ M(ذكر) ☒F(أنثى)

Patient's Job(الوظيفة): [redacted]

Patient's Status(الحالة الاجتماعية):
□ Single(أعزب)
☒ Married(متزوج)
□ other(أخرى): [redacted]

Smoking(التدخين):
□Yes(نعم) ☒No(لا)

Activity(ممارسة نشاط رياضي)
□Yes(نعم) □No(لا)

Phone Number(رقم الهاتف):
[redacted]

Email:(الايميل):

Who referred you(كيف تعرفت على المركز):
□Magazine(مجلات) _____
□Newspaper (جرائد) _____
☒Persons(أشخاص) [redacted]

Primary complaint

Where is the pain and if it radiating(مكان الألم وامتداده):

○**Neck(الرقبة)**: □ right side (الجهة اليمنى): □ shoulder(الكتف) □arm (الساعد) □ hand (اليد)
□ Left side (الجهة اليسرى): □ shoulder (الكتف) □arm (الساعد) □hand (اليد)

○**Mid back (منتصف الظهر)**

○**Low back(أسفل الظهر)**: ☒right side (الجهة اليمنى): □ thigh (الفخذ) □ leg (الساق) □ foot(القدم)
☒ Left side (الجهة اليسرى): □ thigh(الفخذ) □ leg(الساق) □ foot(القدم)

○**Others (أخرى):**

*How long have you had pain? (منذ متى تشعر بالألم)
شهرين

*Do you feel Numbness or Tingling (هل تشعر بخدر أو تنميل أو وخز): ☒Yes(نعم) □No(لا)

INTERNATIONAL
MEDICAL X-RAY CENTRES
OPEN MRI CENTER

المراكز
الدوليه للاشعة الطبية
مركز الرنين المغناطيسي

Patient's Name : [redacted]
Patient's ID. : [redacted]
Age / Sex : [redacted] Years
Doctor's Name : [redacted]

File No. : [redacted]
Report Date : [redacted]/04/2014
Exam Date : [redacted]/04/2014
Exam Time : [redacted]

EXAM: LSS MRI

T1, T2 sag. and T2 axial acquisitions were obtained and showed the following:

Diffuse degenerative changes are noted associated with small marginal osteophytes formation.
MR myelogram shows compression effect at L5/S1 level.
Scoliosis of lumbar spine concave towards the right side.
L2/L3 and L4/L5: Diffuse disc bulge more on the right side causing compression on the anterior aspect of cauda equina and associated with hypertrophy of ligamenta flava and apophyseal joints hypertrophy abutting the nerve roots in the lateral recesses.
L3/L4: Diffuse disc bulge more on the right side causing compression on the anterior aspect of cauda equina with some thickening of ligamenta flava, apophyseal joints hypertrophy and without significant nerve root compression.
L5/S1:Diffuse disc bulge more in right side compressing the anterior aspect of the cauda equina and associated with hypertrophy of ligamenta flava and causing some right nerve root compression in the right lateral recess.

[redacted]

Page : 1

Radiologist [redacted]

Consultant Radiologist [redacted]

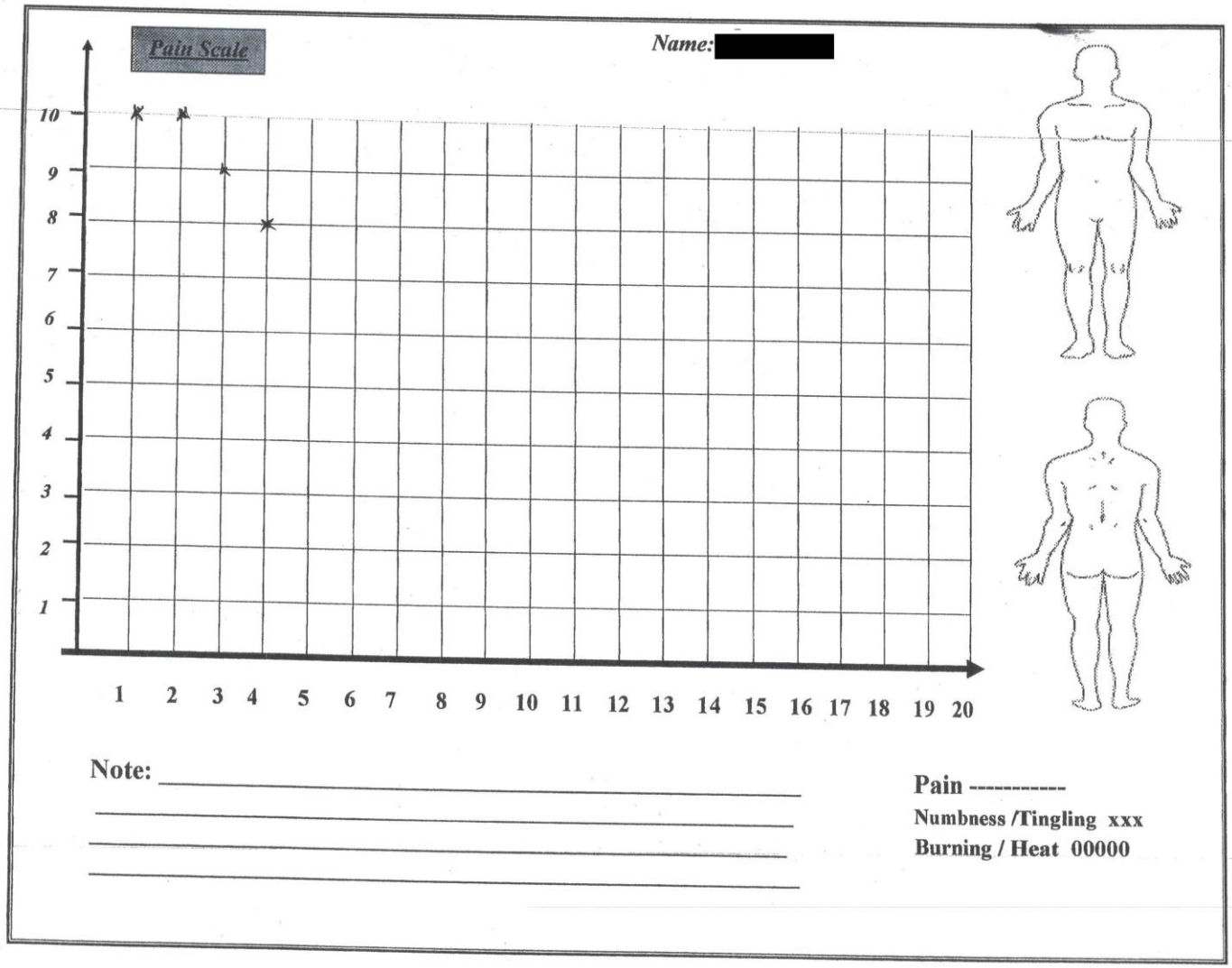
19 IBN KHALDOUN STR. MAGGI BLDG.-JABAL AMMAN
TEL. 4622090 FAX 4622091

جبل عمان - مجمع ماغي - 19 شارع ابن خلدون
تلفون (4622090) فاكس (4622091)

Treatment Sessions:

Patient Name: [redacted] **PT Name:** [redacted]

1 **Date:** [redacted]	Before: LBP Radiating to (R) leg Treatment: Myofascial Release + Heat + IE + [redacted] + Instructions. After: better
2 **Date:** [redacted]	Before: No change Treatment: As the last session + extension exc After: Little better
3 **Date:** [redacted]	Before: Little better Treatment: As the last session + laser (SIJ). After: better
4 **Date:** [redacted]	Before: Much better Treatment: As the last session After: better
5 **Date:**	Before: Treatment: After:
6 **Date:**	Before: Treatment: After:
7 **Date:**	Before: Treatment: After:
8 **Date:**	Before: Treatment: After:
9 **Date:**	Before: Treatment: After:
10 **Date:**	Before: Treatment: After:


Pain Scale
Name: [redacted]
10
9
8
7
6
5
4
3
2
1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Note: _____
Pain ----------
Numbness /Tingling xxx
Burning / Heat 00000

Appendix U: Ethics approval letter from Al Bashir Hospital

مكتب سكينة للترجمة المعتمدة

SUKAINA AUTHORIZED TRANSLATION OFFICE

(TRANSLATION FROM ARABIC)
IN THE NAME OF ALLAH MOST GRACIOUS MOST MERCIFUL

THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF HEALTH

The Hashemite Kingdom of Jordan, Tel. +962-6-5200230, Fax +962-6-5688373,
P.O.Box 86, Amman 11118 – Jordan, Website: www.moh.gov.jo

No. : M.B.A./Ethics Committee/2783
Date : ..... H.
Corr. to : 23.02.2014 G.

Director of Human Resources Development

Dear Sirs,

With reference to your letter No.: Development/Plans/1310 dated 10.02.2014 re the research submitted by the Ph.D. student/ ***Thamer Ahmad Abdul Kareem Altaim*** entitled:

(EXPLORING THE CHARACTERISTICS OF AN OUTCOME MEASUREMENT TOOL FOR CHRONIC LOW BACK PAIN WITHIN THE JORDANIAN HEALTH CARE CONTEXT)

Please be informed that the above mentioned research has been presented to the Academic Research Ethics Committee, and the Committee has decided to approve performing of this research according to the general conditions of the Academic Research Ethics.

For your kind review and for your actions, please.

I, the undersigned, hereby certify that I am conversant in Arabic and English languages, and that the above translation made by me is, to the best of my knowledge and belief, a correct translation of this document, from Arabic into English.

With kind regards.

Director of Al-Bashir Hospital
Dr. Issam Al-Shraideh
(Signed)

وزارة الصحة
المملكة الأردنية الهاشمية
THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF HEALTH

(Stamp of Human Resources Development Dept./ Ministry of Health)

SATO Tel.: 5690077 SUKAINA AUTHORIZED TRANSLATION OFFICE

Certified Translation
03 MAR 2014
Signature

المملكة الأردنية الهاشمية
وزارة الصحة
The Hashemite Kingdom of Jordan
Ministry of Health

Amman, Jabal Al-Hussein, (220) Sukaina Bldg.
Ground Fl. Tel. 5699077 (3 Lines) - Fax (962-6) 5606552
e-mail: sato@satotranslation.com

عمان - جبل الحسين - (٢٢٠) مجمع سكينة التجاري - الطابق الأرضي
المدخل الغربي - هاتف: ٥٦٩٩٠٧٧ (٣ خطوط) - فاكس: ٥٦٠٦٥٥٢ (٦-٩٦٢)

HLTH-CER.ThamerTaim20.doc-3.3.2014

(TRANSLATION FROM ARABIC)
IN THE NAME OF ALLAH MOST GRACIOUS MOST MERCIFUL

THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF HEALTH

The Hashemite Kingdom of Jordan, Tel. +962-6-5200230, Fax +962-6-5688373,
P.O.Box 86, Amman 11118 – Jordan, Website: www.moh.gov.jo

No. : Development/Plans/1615
Date : ..... H.
Corr. to : 25.02.2014 G.

Director of Al-Bashir Hospital
Director of Al-Karak Hospital
Director of Dr. Jamil Totanji Hospital

Dear Sirs,

Please find attached a copy of the letter of Al-Bashir Hospital Director/ Head of Academic Research Ethics Committee No. M.B.A./Ethics Committee/2783 dated 23.02.2014, re the approval of Ph.D. student/ ***Thamer Ahmad Abdul Kareem Altaim*** to perform a research entitled:

(EXPLORING THE CHARACTERISTICS OF AN OUTCOME MEASUREMENT TOOL FOR CHRONIC LOW BACK PAIN WITHIN THE JORDANIAN HEALTH CARE CONTEXT)

You are kindly requested to give your instructions to facilitate the mission of the above mentioned researcher.

With kind regards.

For/ Director of Human Resources Development Dept.
Dr. Fadwa Al-Shawabkeh

Asst. Director of Human Resources Development Dept.
Dr. Amin Al-Maaiteh
(Signed & Stamped)

I, the undersigned, hereby certify that I am conversant in Arabic and English languages, and that the above translation made by me is, to the best of my knowledge and belief, a correct translation of this document, from Arabic into English.

وزارة الصحة
المملكة الأردنية الهاشمية
THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF HEALTH

SATO Tel.: 5690077
مكتب سكينة للترجمة المعتمدة
SUKAINA AUTHORIZED TRANSLATION OFFICE

Certified Translation
03 MAR 2014
Signature

المملكة الأردنية الهاشمية
وزارة الصحة
The Hashemite Kingdom of Jordan
Ministry of Health

Appendix V: Significance of number of improvement or deterioration on a TELER indicator (level of the individual)

CTS-01

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2			1			
3		3	1	1		
4		1		1	1	
5		1	1	3		

CTS-02

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2			1			
3						
4						
5			3		3	

CTS-03

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0	2					
1						
2						
3			1			
4					1	
5		2	3		4	1

CTS-04

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4						
5		2	3		3	2

CTS-05

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3		1				
4		1			2	
5				1	1	

CTS-06

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2	1					
3	1	2				
4	1	3	4			
5		1	1	2	1	

CTS-07

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2	2					
3	4					
4	3					
5	7	3				

CTS-08

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3	1		2			
4			1			
5				1	1	

CTS-09

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4			1			
5		3	2			

CTS-10

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4	1		1			
5		6	6	5	1	

CTS-11

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4	2	1				
5	1	2		1		

CTS-12

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0	3					
1		7				
2			3			
3				3		
4					1	
5						

CTS-13

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0	1					
1		1				
2	2	2	2			
3	1	1	1	2		
4	1	1		1		
5						

CTS-14

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3	2	1				
4	4	1	1			
5				2	1	

CTS-15

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2		1				
3			1			
4	2		2			
5				2		

CTS-16

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3		1	4	1		
4			1	3	1	
5			1	1	1	

CTS-17

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4	1		1	1		
5	1					

CTS-18

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2		3				
3						
4		2		1		
5			1	1	3	

CTS-19

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4						
5		3	3	4	3	

CTS-20

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1		1				
2						
3		2				
4		1	3	1		
5			1	6		

CTS-21

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1		2				
2			1			
3			1	4		
4					3	
5				2		

CTS-22

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4		1	1	1	3	
5			5	2		

CTS-23

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2	2	1				
3	5	3				
4	2	2	1			
5	1	1			2	

CTS-24

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4						
5	1	2	3	5	2	

CTS-25

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4						
5			4	5	3	

CTS-26

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2		1				
3	1		1			
4						
5					2	

CTS-27

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4						
5			2	7	3	

CTS-28

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4						
5		1	3	7	2	

CTS-29

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4						
5		3	3	8	2	

CTS-30

Codes on discharge	Codes on admission					
	0	1	2	3	4	5
0						
1						
2						
3						
4	2	6				
5	2	2	1	1		

Appendix W: The TELER form of participant CTS-07

Low Back Pain patient Spreadsheet Master		Hospital number: SpineCare Jordan																				
	Contact:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Treatments:																						
CTS-07	Date:	23-Jan-14	25-Jan-14	27-Jan-14	29-Jan-14	01-Feb-14	03-Feb-14	05-Feb-14	08-Feb-14	12-Feb-14	16-Feb-14	20-Feb-14	22-Feb-14	27-Feb-14	02-Mar-14	06-Mar-14	09-Mar-14	13-Mar-14	20-Mar-14	23-Mar-14	27-Mar-14	03-Apr-14
Indicators:																						
1. A1		1	1	1	1	2	2	2	2	3	3	3	3	3	3	4	4	4	5	5	5	5
2. B1		1	1	1	2	2	2	3	3	4	4	4	4	4	4	5	5	5	5	5	5	5
3. B2		1	1	1	1	1	2	2	2	2	2	3	3	3	4	4	4	5	5	5	5	5
4. B3		0	1	1	1	1	2	2	2	2	2	3	3	3	3	4	4	5	5	5	5	5
5. C1		0	0	0	0	0	1	1	1	1	1	2	2	2	2	3	3	4	4	5	5	5
6. D1		0	0	0	1	1	1	1	1	1	2	2	2	3	3	4	4	4	4	4	4	4
7. D2		0	0	0	1	1	1	1	2	2	2	2	3	3	4	4	4	4	5	5	5	5
8. E1		0	0	1	1	1	2	2	2	2	3	3	3	3	3	4	4	4	5	5	5	5
9. F1		0	0	0	0	0	1	1	1	1	1	1	2	2	2	3	3	4	4	4	5	5
10. G1		0	0	0	0	0	0	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3
11. G2		0	0	0	0	0	0	0	0	1	1	1	1	2	2	3	3	3	3	3	4	4
12. I1		0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	2	2	3	3	3
13. I2		0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2
14. I3		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2
15.I4		0	0	0	0	0	1	1	1	1	1	1	2	2	3	3	3	4	4	4	4	4
16. K1		0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	2	3	3	3
17. K2		0	0	0	0	0	0	0	1	1	1	1	1	1	2	2	3	3	4	4	5	5
18. K4		0	0	0	0	0	0	0	1	1	1	1	1	1	2	2	3	3	3	4	5	5
19. L1															0	1	1	1	2	2	3	3
20																						
Patient Outcome Indicator		0	0	0	0	0	0	0	0	0	0	0	1	1	3	4						
Contacts to discharge																13	11	8	7	5	4	4
Cost Effective Ratio								1.000	1.317	1.683	2.049	2.463	2.805	3.195	3.585	4.004	4.605	5.169	5.791	6.447	7.163	7.741
Potential savings (Percent of contacts)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deficit Index		97	96	94	91	90	83	81	78	74	71	68	63	60	56	44	42	35	29	23	18	18
Improvement Index			1	2	6	7	14	16	20	23	26	30	34	38	45	58	60	69	74	81	87	87
Variability Index			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Effectiveness Index			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Number of indicator codes	0	18	18	18	18	18	18	18	18	18	18	18	18	18	19	19	19	19	19	19	19	19
Total expected outcome codes	0	90	90	90	90	90	90	90	90	90	90	90	90	90	95	95	95	95	95	95	95	95
Base total		3	3	3	3	3	3	3	3	3	3	3	3	3	9	9	9	9	9	9	9	9
Total indicator codes		3	4	5	8	9	15	17	20	23	26	29	33	36	42	53	55	62	67	73	78	78

Appendix X: Calculations of the probabilities of a statistical significant change in TELER component indicator

Table 1.1

Probability an outcome with a start code of
0 is a random event by clinically significant period

Code	Outcome	Clinically significant period				
		1	2	3	4	5
0	None of the functions	0.5000	0.4167	0.3472	0.3080	0.2785
1	Any one of the functions	0.5000	0.4167	0.4028	0.3728	0.3513
2	Code 1 + any of the 4 remaining functions		0.1667	0.1945	0.2176	0.2252
3	Code 2 + any of the 3 remaining functions			0.0556	0.0833	0.1069
4	Code 3 + any of the 2 remaining functions				0.0185*	0.0341*
5	All 5 functions					0.0062*
	Total	1.0000	1.0001	1.0001	1.0002	1.0024

* statistically significant ($p \leq 0.05$ one tail)

Table 1.2

Probability an outcome with a start code of
1 is a random event by clinically significant period

Code	Outcome	Clinically significant period				
		1	2	3	4	5
0	None of the functions		0.3333	0.2778	0.2685	0.2483
1	Any one of the functions		0.3333	0.3889	0.3425	0.3283
2	Code 1 + any of the 4 remaining functions		0.3333	0.2222	0.2406	0.2309
3	Code 2 + any of the 3 remaining functions			0.1111	0.1110	0.1292
4	Code 3 + any of the 2 remaining functions				0.0370*	0.0492 *
5	All 5 functions					0.0123 *
Total			0.9999	1.0000	1.0006	0.9982

* statistically significant ($p \leq 0.05$ one tail)

Table 1.3

Probability an outcome with a start code of
2 is a random event by clinically significant period

Code	Outcome	Clinically significant period				
		1	2	3	4	5
0	None of the functions				0.1111	0.1296
1	Any one of the functions			0.3333	0.2222	0.2406
2	Code 1 + any of the 4 remaining functions			0.3333	0.3333	0.2590
3	Code 2 + any of the 3 remaining functions			0.3333	0.2222	0.2220
4	Code 3 + any of the 2 remaining functions				0.1111	0.1110
5	All 5 functions					0.0370*
	Total			0.9999	0.9999	0.9992

* statistically significant ($p \leq 0.05$ one tail)

Table 1.4

Probability an outcome with a start code of
3 is a random event by clinically significant period

Code	Outcome	Clinically significant period				
		1	2	3	4	5
0	None of the functions					
1	Any one of the functions					0.1111
2	Code 1 + any of the 4 remaining functions				0.3333	0.2222
3	Code 2 + any of the 3 remaining functions				0.3333	0.3333
4	Code 3 + any of the 2 remaining functions				0.3333	0.2222
5	All 5 functions					0.1111
Total					0.9999	0.9999

Appendix Y: Manual of TELER LBP questionnaire (English)

Summary

Measures: Functional performance

Description: The TELER LBP questionnaire is a valid, reliable and responsive clinical measurement tool that traces changes in functional performance in individuals with low back pain (LBP). The questionnaire is divided into four sections: (a) the quiz-style indicators list, (b) the TELER LBP indicators, (c) the TELER form and (d) the clinical notes.

A- *The quiz-style indicators list*
The first part of the TELER LBP questionnaire includes a list of 29 quiz-style indicators. The first part is design specifically to be used in the initial assessment session to guide LBP patients to select only outcomes that are relevant to them. Following to the identification of the patient's problems and goals, the physiotherapist should select from Part 2 of the questionnaire indicators that can be used to record the achievement of the goals, enabling the documentation of change in functional status that occurs during the physiotherapy treatment.

B- *The TELER LBP indicators*
These are unique ordinal scales that traces changes in the construct "functional performance".

C- *The TELER form*
Part 3 is designed to trace change on a TELER LBP indicator in a LBP patient. This part provide information that can be readily used to inform clinical decision-making.

D- *The clinical notes*
This part is used to document important information that cannot be quantified such as other conditions that affect the patient health status or psychological factors such as fear of movement which might affect physical functioning.

Measurement Properties:

Reliability	Inter-rater reliability : Yes (Excellent) Internal consistency: Yes (Excellent)
Validity	Face validity: Yes Content validity: Yes Construct validity: Yes
Responsive to change	Yes (Excellent)
Sensitivity	Yes (Excellent)
Specificity	Yes (Excellent)
Measurement at the individual level	Yes
Measurement at the group level	Yes

Training: Medium (Requires training of how to use the TELER system).

Equipment: Stop watch, objects of different weights, usual walking aid, and access to bed, chair and stairs.

Space needed: Space for bed, chair, stairs, space for walking or running.

Time to complete: 5 – 20 minutes

Good things about it:

In a clinical context: The TELER LBP questionnaire can be used in the initial assessment session to identified limitations in activities of daily living. It also can be used in follow up sessions to trace changes in the construct functional performance. The TELER LBP questionnaire was designed specifically to provide information that is readily accessible and inform decision-making process whether to continue the current LBP management, change interventions, refer the patient to a specialist or discharge the patient. Quantitative data collected at the individual level can be aggregated to provide information to a clinic manager about the quality of service provided.

In a research setting: The TELER LBP questionnaire can be used in appropriate research design to provide data that can analysed to determine whether an outcome is attributable to the therapeutic input or to spontaneous recovery.

Limitations:

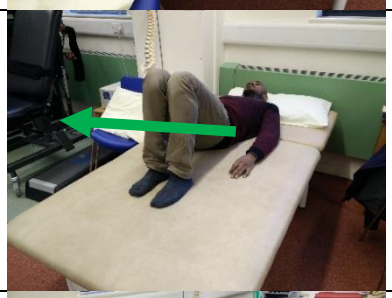
- Ceiling effect for more able patients.
- This questionnaire was validated in Jordan using an Arabic speaking sample of individuals with non-specific LBP.

Clarity:

Each code in any TELER LBP indicator provide a singular meaning which make the majority of these indicators clear and easy to understand; However, some people might find few of the functional indicators, especially the ones that represent a movement analysis, are difficult to understand and require more clarifications. Therefore, in order to facilitate understanding of these indicators, an image was attached to each code. The following pages in this manual show these TELER LBP indicators.

Last updated: May 2015

B1- Bed mobility: not hierarchical (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Choice	Low back pain does not prevent bending hips and knees.	
Choice	Low back pain does not prevent maintaining hips and knees in flexion	
Choice	Low back pain does not prevent lifting bottom	
Choice	Low back pain does not prevent shifting bottom across	
Choice	Low back pain does not prevent shifting shoulders and head across	

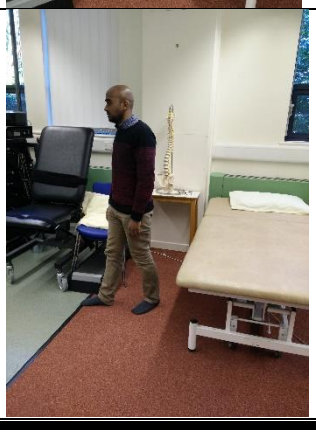
B2 - Lying to sitting over edge of bed (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents moving functionally in bed	
Code 1	Low back pain does not prevent achieving crock lying	
Code 2	Low back pain does not prevent achieving modified bridge to move sideways	
Code 4	Low back pain does not prevent achieving rolling into side lying (with knees bent)	
Code 4	Low back pain does not prevent achieving pushing body upwards supported on forearms	
Code 5	Low back pain does not prevent achieving sitting at the edge of the bed (by dropping legs over side and pushing the body upwards using arms)	

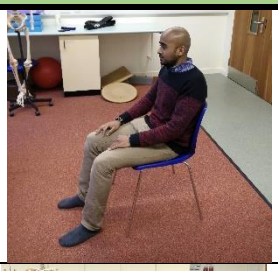
B3 – Lying to sitting on bed (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents siting in bed from lying	
Code 1	Low back pain does not prevent lifting and turning head and upper trunk	
Code 2	Low back pain does not prevent moving arm under the body and rotating head and the upper trunk	
Code 3	Low back pain does not prevent extending the supporting arm, rotating lower trunk and lifting legs off bed	
Code 4	Low back pain does not prevent transferring weight onto bottom	
Code 5	Low back pain does not prevent getting into sitting and lifting arms off bed	

C1 – Get out of bed without help (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Unable to get out of bed due to low back pain	
Code 1	Able to achieve sitting over the edge of the bed with help	
Code 2	Able to achieve sitting over the edge of the bed without help	
Code 3	Able to transfer between sitting and standing without help	
Code 4	Able to maintain standing without support	
Code 5	Walking away from the bed without help	

D1 – Standing up straight from sitting (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents standing from sitting	
Code 1	Low back pain does not prevent moving forwards on bed or chair	
Code 2	Low back pain does not prevent transfering body weight over feet	
Code 3	Low back pain does not prevent lifting bottom off bed or chair	
Code 4	Low back pain does not prevent fully extending hips, knees or trunk (not all of them) to achieve standing	
Code 5	Low back pain does not prevent fully extending hips, knees and trunk to achieve standing up straight	

D2 – Sitting from standing (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Sits down with no control due to low back pain	
Code 1	Low back pain does not prevent bringing body weight forwards, from standing position	
Code 2	Low back pain does not prevent bending hips and knees	
Code 3	Low back pain does not prevent using arms to support sitting	
Code 4	Low back pain does not prevent lowering smoothly onto bed or chair	
Code 5	Low back pain does not prevent sitting completely/properly on the bed or chair	

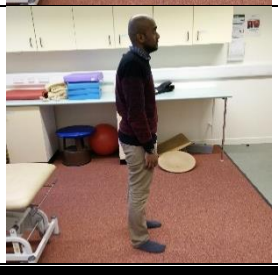
D3 – Standing up straight from floor sitting (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents transferring weight into side sitting	
Code 1	Low back pain does not prevent transferring weight into side sitting	
Code 2	Low back pain does not prevent transferring weight forwards over knees (in order to achieve kneeling position).	
Code 3	Low back pain does not prevent extending hips into high kneeling and placing non weight bearing foot on the floor	
Code 4	Low back pain does not prevent transferring weight onto the foot (forward) and extending the hip and knee	
Code 5	Low back pain does not prevent standing up straight.	

G1 – Bend trunk forward (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents bending the trunk forwards	
Code 1	Pain on initiating forward bending, pain free at standing position	
Code 2	Low back pain prevents forward bending (before reaching mid-range of trunk movement), unable to continue	
Code 3	Low back pain does not prevent forward bending, able to continue but cannot fully bend the trunk	
Code 4	Pain when trunk is fully flexed	
Code 5	Full active range of trunk movement forwards, without feeling pain in the lower back	

G2 - Raising the trunk upwards to the upright position from bending forwards (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents rising trunk upwards	
Code 1	Pain initiating on raising the trunk upwards, pain free when bending the trunk forwards	
Code 2	Low back pain interrupts raising the trunk upwards (before reaching mid-range of trunk movement), unable to continue	
Code 3	Low back pain interrupts raising the trunk upwards, able to continue but cannot stand up upright	
Code 4	Low back pain prevents standing up upright.	
Code 5	Low back pain does not prevents standing up upright.	

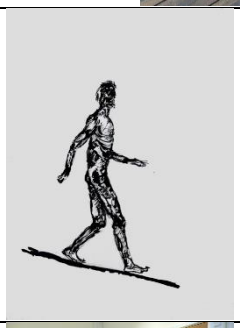
H1 – Squatting from standing up straight and maintaining the position (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents squatting	
Code 1	Low back pain does not prevent leaning forwards in preparation of squatting	
Code 2	Low back pain interrupts bending the hips, knees and ankle joints, unable to continue	
Code 3	Low back pain interrupts bending the hips, knees and ankle joints, able to continue	
Code 4	Low back pain does not prevent squatting, unable to maintain this position due to pain	
Code 5	Low back pain does not prevent squatting, able to maintain this position	

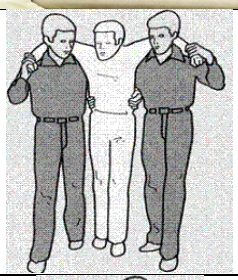
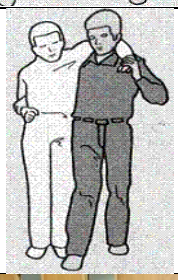
H2 – Standing up straight from squatting position (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents standing up straight from a squatting position	
Code 1	Low back pain interrupts extending the hips, knees and ankle joints, unable to continue.	
Code 2	Low back pain interrupts extending the hips, knees and ankle joints, able to continue	
Code 3	Low back pain does not prevent raising the lower back upwards	
Code 4	Low back pain doe not prevent raising the upper back upwards to fully straighten up	
Code 5	Low back pain does not prevent standing up straight from squatting	

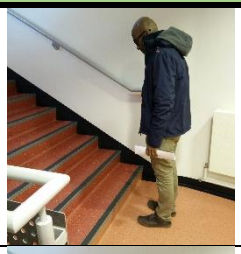
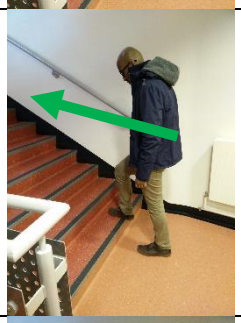
I1 - Functional walking: not hierarchical (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Choice	Walk in different directions	
Choice	Change directions	
Choice	Walk on different everyday surfaces	 
Choice	Able to negotiate slopes	
Choice	Able to negotiate confined spaces	

I4 - Walk independently (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents walking	
Code 1	Low back pain does not prevent walking with help from two bases of support (2 people)	
Code 2	Low back pain does not prevents walking with help from one base of support (1 people)	
Code 3	Low back pain does not prevent walking with the help of stick	
Code 4	Low back pain does not prevent walking (without support but with bent trunk)	
Code 5	Low back pain does not prevent walking independently (without help and with straight back)	

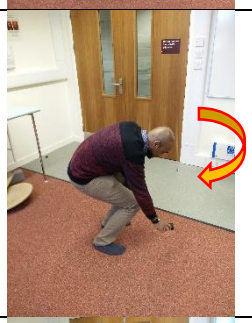
K2 – Climbing one step (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents placing foot on step	
Code 1	Low back pain does not prevent transferring weight onto 1 foot, maintaining body balance and placing non weight bearing foot on step	
Code 2	Low back pain does not prevent transferring weight onto foot placed on step above	
Code 3	Low back pain does not prevent extending weight bearing hip and knee	
Code 4	Low back pain does not prevent flexing non-weight bearing hip and knee	
Code 5	Low back pain does not prevent placing other foot on the next step above	

K4 – Descending one step (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents placing foot on lower step	
Code 1	Low back pain does not prevents transferring one foot on the lower step and loading body weight on the other leg	
Code 2	Low back pain does not prevent flexing hip, knee and ankle of rear weight bearing leg	
Code 3	Low back pain does not prevent placing non-weight bearing foot onto the lower step	
Code 4	Low back pain does not prevent transferring weight onto foot placed on the lower step	
Code 5	Low back pain does not prevent placing other foot onto the lower step	

L1 – Lifting objects (low back pain patients)

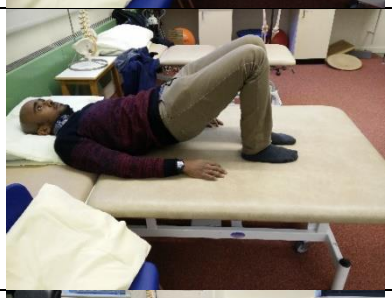
TELER code	TELER code's descriptor	Demonstration
Code 0	Low back pain prevents bending trunk, hips, and lower limbs	
Code 1	Low back pain does not prevent bending trunk, hips, and lower limb, but it prevents lifting (**Specify a small size object for lifting**)	
Code 2	Low back pain interrupt lifting (**Specify a small size object for lifting**), unable to continue due to pain	
Code 3	Low back pain does not prevent lifting (**Specify a small size object for lifting**)	
Code 4	Low back pain does not prevent lifting (**Specify a medium size object for lifting**)	
Code 5	Low back pain does not prevent lifting (**Specify a large size object for lifting**)	

L3 – Lowering an object (low back pain patients)

TELER code	TELER code's descriptor	Demonstration
Code 1	Low back pain prevents lowering a carried object from a standing position	
Code 1	Low back pain does not prevent bending trunk forwards and maintain carrying an object.	
Code 2	Low back pain interrupts bending hips, knees and ankles, unable to continue	
Code 3	Low back pain interrupts bending hips, knees and ankles, able to continue	
Code 4	Low back pain interrupts lowering down a carried object from a standing position, able to continue without interruption	
Code 5	Low back pain does not prevents lowering a carried object on the ground from a standing position	

Appendix Z: Manual of TELER LBP questionnaire (Arabic)

B1 - الحركة في السرير (غير تصاعدي)

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار	قادر على ثني مفصلي الورك والركبتين	
الخيار	قادر على المحافظة على ثني مفصلي الورك والركبتين	
الخيار	قادر على رفع المؤخرة	
الخيار	قادر على تحريك المؤخرة للجانب	
الخيار	قادر على تحريك الكتفين و الرأس للجانب	

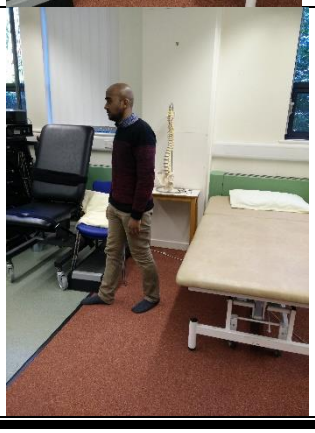
B2 - النهوض من الاستلقاء الى الجلوس على طرف السرير

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	لا أستطيع الحركة في السرير بسبب الألم في أسفل الظهر	
الخيار 1	أستطيع ثني الركبتين خلال الاستلقاء	
الخيار 2	أستطيع رفع الجسم كجسر للتحرك الى الجانبين	
الخيار 3	أستطيع الدوران الى النوم على الجانب (مع ثني الركبتين)	
الخيار 4	دفع الجسم للأعلى بالاستناد على الساعد	
الخيار 5	أستطيع تحقيق الجلوس على طرف السرير (عن طريق إنزال القدمين الى الجانب ودفع الجسم للأعلى باليد)	

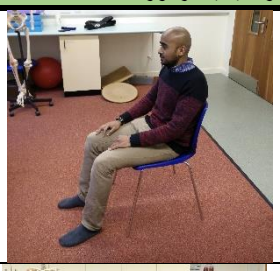
B3 - النهوض من الاستلقاء للجلوس على السرير مع فرد الرجلين

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على الجلوس على السرير من وضعية الاستلقاء بسبب ألم أسفل الظهر	
الخيار 1	قادر على رفع وتدوير الرأس والجذع العلوي من الجسم	
الخيار 2	قادر على تحريك اليد تحت الجسم وتدوير الجزء العلوي من الجذع	
الخيار 3	قادر على فرد اليد الداعمة للجسم، تدوير الجزء السفلي من الجذع ورفع القدمين على السرير	
الخيار 4	قادر على تحميل الوزن على المؤخرة.	
الخيار 5	قادر على الجلوس ورفع الأيدي عن السرير	

C1 - الخروج من السرير بدون مساعدة

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على الخروج من السرير بسبب ألم في أسفل الظهر	
الخيار 1	قادر على تحقيق وضعية الجلوس على طرف السرير بمساعدة	
الخيار 2	قادر على تحقيق وضعية الجلوس وبدون مساعدة	
الخيار 3	قادر على التنقل من الجلوس الى الوقوف وبدون مساعدة	
الخيار 4	المحافظة على وضعية الوقوف بدون مساعدة	
الخيار 5	المشي بعيدا عن السرير من دون مساعدة	

D1 - الوقوف باستقامة من الجلوس

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على الوقوف من الجلوس بسبب ألم أسفل الظهر	
الخيار 1	قادر على التحرك للأمام من فوق الكرسي أو السرير	
الخيار 2	قادر على حمل وزن الجسم على الأقدام	
الخيار 3	قادر على رفع المؤخرة من على الكرسي أو السرير	
الخيار 4	قادر على فرد أي من الحوض أو الركبتين أو الجذع بشكل كامل (ليس جميعهم)	
الخيار 5	قادر على فرد الحوض والركبتين والجذع بشكل كامل لتحقيق وضعية الوقوف باستقامة	

D2 - الجلوس من الوقوف

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	الجلوس من دون تحكم بسبب ألم أسفل الظهر	
الخيار 1	إحضار وزن الجسم الى الأمام في وضعية الوقوف	
الخيار 2	ثني مفصلي الورك والركبتين	
الخيار 3	استخدام اليدين للمساعدة على الجلوس	
الخيار 4	إنزال الجسم بشكل سلس الى الكرسي أو السرير	
الخيار 5	الجلوس بشكل كامل وبدون ألم	

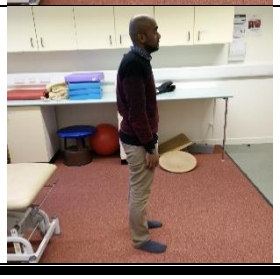
D3 - الوقوف باستقامة من وضعية الجلوس على الأرض

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	عدم المقدرة على نقل الوزن بوضعية الجلوس الجانبي بسبب ألم أسفل الظهر	
الخيار 1	قادر على نقل وزن الجسم الى وضعية الجلوس الجانبي	
الخيار 2	قادر على نقل الوزن الى الأمام فوق الركبتين (لتحقيق وضعية الوقوف على الركب)	
الخيار 3	قادر على فرد مفصلي الورك الى الأعلى لأخذ وضعية الوقوف على الركب ومن ثم تحريك القدم غير محملة الوزن على الأرض	
الخيار 4	قادر على تحميل الوزن على القدم الأمامية وفرد مفصلي الورك والركبة	
الخيار 5	قادر على الوقوف باستقامة	

G1 - ثني الجذع الى الامام من دون الشعور بالألم في أسفل الظهر

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على ثني الجذع للأمام بسبب الألم في أسفل الظهر	
الخيار 1	الالم في أسفل الظهر يكون عند البدء بثني الجذع ولكن ليس هنالك ألم في وضعية الوقوف	
الخيار 2	الشعور بالألم في أسفل الظهر عند ثني الجذع (قبل الوصول لمنتصف مدى الحركة)، ولكن لا أستطيع المواصلة	
الخيار 3	الشعور بالألم في أسفل الظهر عند ثني الجذع وأستطيع المواصلة ولكن ليس بشكل كامل	
الخيار 4	الشعور بالألم في أسفل الظهر عند ثني الجذع بشكل كامل	
الخيار 5	ثني الجذع بشكل كامل للأمام بدون ألم في أسفل الظهر	

G2 - رفع الجذع الى الأعلى من وضعية الثني للأمام من دون الشعور بالألم في أسفل الظهر

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على رفع الجذع للأعلى بسبب الألم في أسفل الظهر	
الخيار 1	الالم يكون عند البدء برفع الجذع للأعلى ولكن ليس هنالك ألم في وضعية ثني الجذع للأمام	
الخيار 2	الشعور بالألم في أسفل الظهر عند رفع الجذع للأعلى (قبل الوصول لمنتصف مدى الحركة)، ولكن ليس بشكل كامل	
الخيار 3	الشعور بالألم في أسفل الظهر عند رفع الجذع للأعلى وأستطيع المواصلة ولكن ليس بشكل كامل	
الخيار 4	الشعور بالألم في أسفل الظهر عند الوقوف باستقامة	
الخيار 5	رفع الجذع للأعلى للوصول لوضعية الوقوف باستقامة بدون ألم في أسفل الظهر	

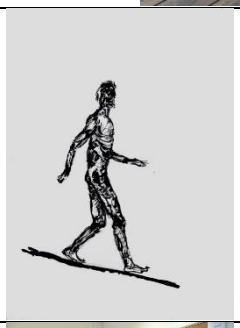
H1 - القرفصاء من الوقوف باستقامة و المحافظة عليها بدون ألم

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على تحقيق وضعية القرفصاء بسبب ألم أسفل الظهر	
الخيار 1	قادر على ثني الجذع الى الأمام	
الخيار 2	الألم يقاطع القدرة على ثني مفصلي الورك والركبتين والكاحل، لا أستطيع المواصلة	
الخيار 3	الألم يقاطع القدرة على ثني مفصلي الورك والركبتين والكاحل، لكن أستطيع المواصلة	
الخيار 4	قادر على تحقيق القرفصاء ولكن لا أستطيع المحافظة عليها بسبب ألم أسفل الظهر	
الخيار 5	قادر على المحافظة على وضعية القرفصاء وبدون ألم في أسفل الظهر	

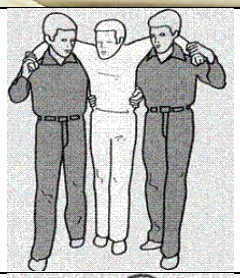
H2 - الوقوف باستقامة من وضعية القرفصاء

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على الوقوف باستقامة من وضعية القرفصاء بسبب ألم أسفل الظهر	
الخيار 1	الألم يقاطع القدرة على فرد مفصلي الورك والركبتين والكاحل، لا أستطيع المواصلة	
الخيار 2	الألم يقاطع القدرة على فرد مفصلي الورك والركبتين والكاحل، لكن أستطيع المواصلة	
الخيار 3	قادر على رفع أسفل الظهر الى الاعلى	
الخيار 4	قادر على رفع أعلى الظهر للوصول الى الاستقامة بالوقوف	
الخيار 5	الوقوف باستقامة من وضعية القرفصاء بدون ألم في أسفل الظهر	

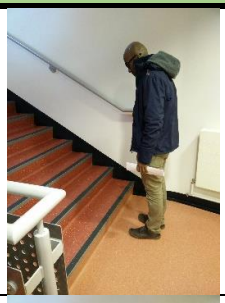
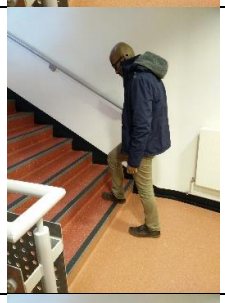
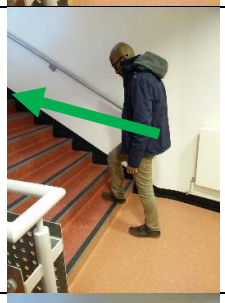
I1 - أداء وظيفة المشي

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار	المشي في عدة اتجاهات	
الخيار	تغيير الاتجاهات	
الخيار	المشي على الأسطح المختلفة في الحياة اليومية	 
الخيار	قادر على التعامل مع المنحدرات	
الخيار	قادر على التعامل مع الأماكن الضيقة	

I4 - المشي بدون مساعدة

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على المشي	
الخيار 1	أمشي بمساعدة قاعدتين للدعم (شخصين).	
الخيار 2	أمشي بمساعدة قاعدة واحدة للدعم (شخص).	
الخيار 3	أمشي بمساعدة عكاز	
الخيار 4	أمشي بدون أي مساعدة ولكن بظهر غير معتدل	
الخيار 5	أمشي بشكل مستقل، بدون مساعدة وبظهر معتدل	

K2 - صعود درجة واحدة

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على وضع القدم على الدرجة	
الخيار 1	قادر على نقل القدم على الدرجة وتحميل وزن الجسم على القدم الأخرى مع المحافظة على توازن الجسم	
الخيار 2	قادر على نقل وزن الجسم على القدم الموضوعة على الدرجة	
الخيار 3	قادر على فرد مفصلي الورك والركبة حاملة الوزن.	
الخيار 4	قادر على ثني مفصلي الورك والقدم غير حاملة الوزن	
الخيار 5	قادر على وضع القدم الأخرى على الدرجة العلوية التالية	

K4 - نزول درجة واحدة

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على وضع القدم على الدرجة السفلية بسبب الألم	
الخيار 1	قادر على نقل القدم على الدرجة السفلية مع تحميل الوزن على القدم الأخرى	
الخيار 2	قادر على ثني مفصلي الورك والركبة والكاحل للقدم حاملة الوزن	
الخيار 3	قادر على وضع القدم غير حاملة الوزن على الدرجة السفلية	
الخيار 4	قادر على نقل الوزن على القدم الموضوعة على الدرجة السفلية	
الخيار 5	قادر على وضع القدم الأخرى على الدرجة السفلية	

L1 - رفع الأجسام بدون ألم

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على ثني الجذع، ومفصلي الورك والأطراف السفلية بسبب الألم	
الخيار 1	قادر على ثني الجذع ومفصلي الورك والأطراف السفلية بدون ألم ولكن غير قادر على رفع **(حدد الجسم الأصغر للحمل)**	
الخيار 2	قادر على رفع **(حدد الجسم الأصغر للحمل)** ولكن لا أستطيع المواصلة بسبب الألم	
الخيار 3	قادر على رفع **(حدد الجسم الأصغر للحمل)** بدون ألم	
الخيار 4	قادر على رفع **(حدد الجسم المتوسط للحمل)** بدون ألم	
الخيار 5	قادر على رفع **(حدد الجسم الأكبر للحمل)** بدون ألم	

L3 - إنزال جسم* محمول على الأرض من وضعية الوقوف

رموز TELER	الوصف العام لرمز TELER	صور توضيحية لرموز TELER
الخيار 0	غير قادر على تنزيل الجسم المحمول من وضعية الوقوف بسبب ألألم في أسفل الظهر	
الخيار 1	قادر على ثني الجذع الى الأمام مع المحافظة على حمل الجسم	
الخيار 2	الألم يقاطع القدرة على ثني مفصلي الورك والركبتين والكاحل، لا أستطيع المواصلة	
الخيار 3	الألم يقاطع القدرة على ثني مفصلي الورك والركبتين والكاحل، لكن أستطيع المواصلة	
الخيار 4	الألم يكون عند إنزال جسم محمول على الأرض من وضعية الوقوف ولكن أستطيع المواصلة بدون مقاطعة	
الخيار 5	قادر على إنزال جسم محمول على الأرض من وضعية الوقوف وبدون ألم في أسفل الظهر