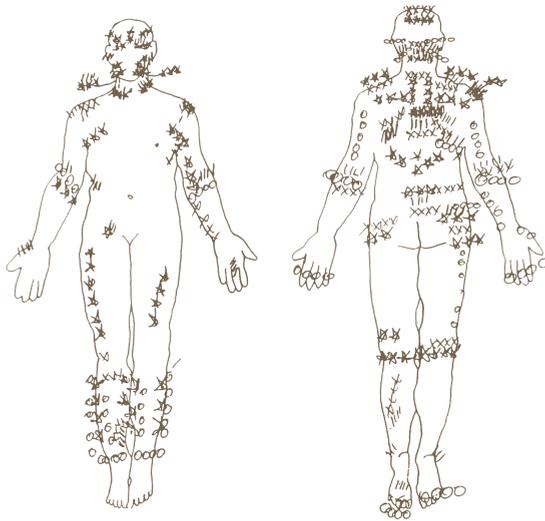# CHAPTER 1

Introduction

In the United States, chiropractic is a large and well-established health care profession.[1] In Europe, in general, and Belgium and the Netherlands in specific, chiropractic is still considered a non-conventional or alternative form of health care. At the end of 2015, there are 117 chiropractors in Belgium and approximately 350 in the Netherlands. Chiropractic is defined by the World Federation of Chiropractic as 'a health profession concerned with the diagnosis, treatment and prevention of mechanical disorders of the musculoskeletal system, and the effects of these disorders on the function of the nervous system and general health. There is an emphasis on manual treatments including spinal adjustment and other joint and soft-tissue manipulation'.[2]

This thesis contributes to the growing body of research within the chiropractic profession in Europe. More and more research in musculoskeletal health care comes from allied health care professions.[3] A master's thesis from the University of Southern Denmark in 2012 demonstrated that in Denmark, where the chiropractic profession is fully integrated in the health care system, the sharp rise in spine research since 2002 is 'driven entirely by allied health care professionals, mainly chiropractors'.[3]

Clinical and epidemiological peer-reviewed publications dealing with back pain from Denmark 1995-2012
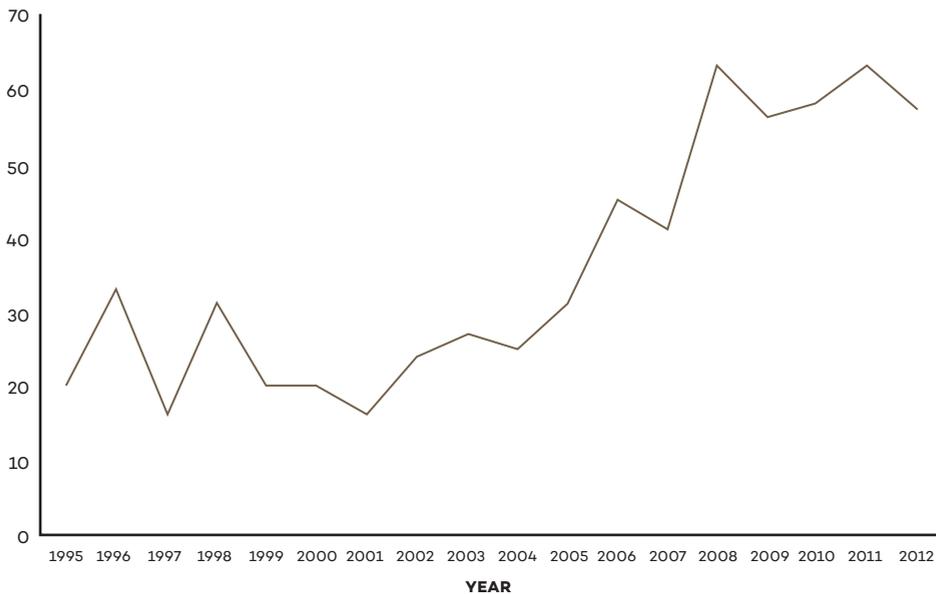
In his PhD thesis Sidney Rubinstein examined the biomedical factors as predictors of a favorable outcome and the predictors of adverse events following chiropractic care for patients with neck pain. In the recommendations for future research, he stated in 2008 that 'future studies should examine the contribution of other predictors to outcome with chiropractic care'.[4] For example, he stated, 'it would be valuable to examine how other psychosocial factors such as attitudes and beliefs about pain, illness behavior, or psychosocial distress relate to outcomes'.[4] Also one of the recommendations issued by the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders was that future research should concentrate on longitudinal designs exploring preventive strategies and modifiable risk factors for neck pain.[5] This thesis builds on those recommendations.

Our main objective was to examine the relative impact of psychosocial factors on outcome in patients with neck pain or LBP treated by chiropractors. We conducted a large cohort study in Belgium and the Netherlands. Data from more than one country contribute to the robustness of the data, and recruiting patients from 2 countries allows for a larger cohort. We therefore started with a descriptive study on the sociodemographic and practice characteristics of chiropractors and the sociodemographic characteristics and the type of complaints of the patients consulting a chiropractor in Belgium (Chapter 2). The characteristics of patients in the Netherlands had been described earlier by Rubinstein et al.[6]

Do chiropractors ask the right questions? Do they use the proper measurement instruments? Do these instruments measure what they aim to measure? In Chapters 3 and 4 we describe the evaluation of a measurement instrument that is used by chiropractors in their daily practice and in research: the Neck Disability Index – Dutch Version (NDI-DV). This questionnaire was developed in the '80s and '90s of the past century. In that era, many a questionnaire was developed by clinicians for clinicians, in an attempt to establish a way to quantitatively measure the impact of a condition on a patient's life. Our research team decided to critically assess the NDI, as it is the most frequently used and evaluated disease-specific patient reported outcome questionnaire in patients with neck pain.[7] The COnsensus-based Standards for the selection of health status Measurement INstruments (COSMIN) were used to evaluate the measurement properties of this Health-Related Patient-Reported Outcome (HR-PRO).[8] We believe this critical appraisal is important as researchers, including our research team, and clinicians utilize the NDI to measure the level of disability and to study the effect of an intervention on patients with neck pain.[9-12]

The main body of this thesis reports on a large cohort of 917 patients, 326 with neck pain and 591 with low-back pain, treated by chiropractors in Belgium and the Netherlands. In Chapter 5 we examine whether there is an association of certain psychosocial factors

with the outcomes pain and functional status. In Chapter 6 we examine whether adding psychosocial factors to already known biomedical factors, such as the nature, duration and severity of the condition measured at baseline provides additional predictive value to chiropractors in patients presenting with neck pain or low back pain (LBP). A random sample of 15 chiropractic practices in Belgium and 25 chiropractic practices in the Netherlands demonstrated that at this point, very few chiropractors consistently screen for psychosocial status using validated questionnaires at baseline.

In order to examine the relative impact of psychosocial factors on outcome in patients with neck pain or LBP treated by chiropractors, we assess the following social and psychological factors at baseline: distress, depression, anxiety and somatization (via the 4 scales of the Dutch version of the 4 Dimensional Symptom Questionnaire or 4DSQ, consisting of 50 questions, aimed at psychosocial complaints),[13] the patient's beliefs with regard to the effect of physical activity and work on their spinal complaint (via the Dutch version of the Fear Avoidance Beliefs Questionnaire or FABQ, consisting of 2 subscales which facilitate the identification of the patient's beliefs about how work and physical activity affect their current spine pain),[14] and social support (by using the Dutch version of the Feij Social Support scale, consisting of 12 items identifying the level of social support by family and friends).[15]

The traditional approach to evaluating and treating LBP was challenged in 1987 by a landmark publication; Gordon Waddell's VOLVO award winning paper entitled "A new clinical model for the treatment of low-back pain"[16] introduced the biopsychosocial model of low back pain, emphasizing the distinction between pain and disability and the need to address the psychological and social aspects of the condition, in addition to the biological aspects. He promoted the term "simple back pain" to describe the majority of patients with this common symptom in whom a specific source of pain could not legitimately be identified. However, Waddell also identified the need for future research to identify methods and tests that would allow clinicians to determine the source of a patient's pain. Recently however, some researchers are wondering "what happened to the 'bio' in the bio-psycho-social model of low back pain"?[17] We wanted to find out if indeed the emphasis shifted too far away from the biological aspects, and what the role or importance is of psychosocial factors in chiropractic, where patients present with moderate amounts of pain with moderate effect on the patients' activities of daily living? In case our research would prove psychosocial factors to be relevant to the chiropractic practice, this would indicate a shift in the chiropractic paradigm.

In the last part of this thesis (Chapter 7) we examine the use of frequent data gathering to describe the course of neck pain and LBP, and in Chapter 8 we assess the correlation between data collected by questionnaires to the data collected by weekly text messages

(SMS) on the patients' cell phones. In the past, in order to chart the course of spinal pain researchers relied primarily on data collected on a small number of time points during the follow-up period of 1, 3, 6 to 12 months. Data collection through frequent text messaging via patients' cell phones is a novel technique that has the potential of profoundly changing the methods of data collection in spine research in the future, thereby allowing for better charting of the course of spinal pain.[18-21] Before the arrival of these novel methods to collect data, there were only two studies that relied on more frequent data collection to chart the course of LBP: Dunn, Jordan and Croft's study in 2006 used monthly questionnaires by mail over a period of 6 months,[22] and Tamcan and colleagues in 2010 used frequent data collection (weekly, during 1 year) by means of a one-page diary via email or postal service.[23] We use specific statistical procedures to describe the trajectories of neck pain and LBP. Studies in the past on the course of spinal pain have almost exclusively focused on the course of LBP, and we are particularly interested to see whether the trajectories in a chiropractic population would correspond to those described by Dunn and colleagues. We are also interested to see whether or not the trajectories of neck pain would follow those seen in people with LBP.

PRINCIPAL RESEARCH QUESTIONS

The following research questions will be answered in the various chapters of this thesis:
1. Do the sociodemographic and practice characteristics of chiropractors and the sociodemographic characteristics and the type of complaints of the patients consulting a chiropractor in Belgium resemble the characteristics of chiropractors and their patients in the Netherlands, described earlier by Rubinstein et al?[3]
2. With regards to the Dutch Version of the Neck Disability Index (NDI-DV), one of the most often used questionnaires in chiropractic practice and research:
   a. Is there a clear construct to be measured?
   b. Does the content validity meet the four requirements set forth by the COnsensus-based Standards for the selection of health status Measurement INstruments (COSMIN) and is the NDI-DV a valid HR-PRO?
   c. Can we establish an evidence-based recommendation for the pragmatic use of the NDI-DV in primary (chiropractic) care, based on an assessment of the reliability, the responsiveness, and the interpretability of the NDI-DV?
3. Is there an association between certain psychosocial factors and outcome in patients with neck pain and/or LBP treated by chiropractors?

4. Do psychological and/or social factors add predictive value to those biomedical factors already known to be associated with a better or worse outcome in patients with neck pain and/or LBP treated by chiropractors?
5. With regards to the course of neck pain and LBP:
   a. Does the course of LBP in patients treated by chiropractors follow the trajectories seen in primary medical care as described by Dunn et al?
   b. Is membership in a specific cluster or trajectory associated with other characteristics at baseline?
   c. Do neck pain and LBP have the same clusters?
6. How well do data collected by an automated SMS-track system, where patients receive weekly SMS messages, correlate with data collected on a monthly basis by electronic questionnaires, asking the same questions regarding pain intensity and limitations in activities of daily living?

OUTLINE OF THIS THESIS

This thesis is divided into the following chapters: You have just read chapter 1, which was the introduction to this thesis, providing a rationale for this work. Chapter 2 describes the characteristics of chiropractors and their patients in Belgium, and also describes the practice characteristics, the chiropractors' opinion on the scope of their practice and the techniques used. Chapter 3 and chapter 4 examine the measurement properties of the NDI-DV, a much used patient-reported outcome in musculoskeletal health care dealing with patients with neck pain. Construct to be measured, validity, reliability, responsiveness and interpretability of this HR-PRO are examined and described. Chapter 5 and chapter 6 focus on the effect of psychosocial factors on outcome in patients with neck pain and/or LBP treated by chiropractors in Belgium and the Netherlands; chapter 5 examines whether there is an association between psychosocial factors and outcome, whereas chapter 6 answers the question whether extensive screening for psychosocial factors at baseline helps better predict than the biological factors alone who is likely to recover, have diminished pain and/or function in patients with neck pain or LBP. Chapter 7 illustrates the course of neck pain and LBP over a period of 26 weeks, using latent class growth analysis on frequent data gathered over a longer period of time (up to 52 weeks) by a novel technique (SMS-track). Chapter 8 answers the question how well measurements of pain, measured by monthly questionnaires, correlate with data collected weekly by weekly SMS messages. Chapter 9 is reserved for a general discussion, and in chapter 10 a summary is provided in English and in Dutch.

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