SCIATICA AND DISC HERNIATION:
THE COMPLEXITY OF SELF-REPORTED SYMPTOMS, HEALTH COMPLAINTS, AND RETURN TO WORK

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SCIATICA AND DISC HERNIATION: THE COMPLEXITY OF SELF-REPORTED SYMPTOMS, HEALTH COMPLAINTS, AND RETURN TO WORK

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1 PREFACE

This thesis reports a research project that addressed different aspects of sciatica. It was carried out at the Rheumatology Department at Sykehuset Østfold, in co-operation with my colleague, Dr Anne Julsrud Haugen. The Back Clinic at the Rheumatology Department investigates and treats about 1,700 outpatients and 250 inpatients per year, a large proportion of whom suffer from sciatica. In caring for sciatica patients, we realized that the existing literature was inadequate in informing patients and doctors about the prognosis of sciatica in terms of pain, disability, and work. This inspired us to establish a prospective cohort study in collaboration with the Back Clinics at Sørlandet Sykehus, Ullevål Universitetssykehus, and Sykehuset Innlandet. We both participated in the preparation of the protocol and in the collection and analysis of the data, and we were supervised together. Unfortunately, illness prevented me from undertaking the training component of the university's normal PhD programme. Instead, I have applied for the academic degree of dr.philos.

This research has culminated in Anne's dissertation "Sciatica and Disc Herniation. Outcome Measures and Prognostic Factors" and the present thesis. Because of the interrelatedness of our work, we suggest that those interested in this topic should read both theses together.

2 ACKNOWLEDGEMENTS

First and foremost, I am greatly indebted to my dear colleague Anne, for her generous friendship and kind co-operation over many years. Her ideas, humour, and never-ending enthusiasm have made this work an absolute pleasure and a joyful experience. During my illness, she took charge of the daily running of the cohort study, on top of her busy clinical work. Without Anne's efforts at that time, the entire project would probably have run aground. She phoned me daily with updates, giving me invaluable support and encouragement. After countless talks and discussions, we have both moved forward in the intellectual and practical labyrinth of research.

Our co-authors and supervisors have contributed greatly to this work. They have given generously of their time and expertise to nurture two research novices. Comments, advice, and corrections have been given, and extremely fruitful and inspiring discussions have taken place. We were very fortunate that Margreth Grotle (principal supervisor), Bård Natvig, and

Jens Ivar Brox (co-supervisors), and Anne Keller took a chance on us. They have contributed their great experience, insight, and patience.

We are also grateful to our colleagues, who included patients and provided data. Without the efforts of Dag Soldal, Bjarte Justnæs, Anne Keller, Eli Molde Hagen, Knut Morten Huneide, and Anett Bjørnødegård, this project would not have been possible. Camilla Ihlebæk provided the general population data set used to analyse the subjective health complaints and co-authored paper III. Eli Minge did an excellent job distributing more than 2,000 large questionnaires to the right patients at the right time and collecting the data.

We extend special thanks to Prof. Leiv Sandvik, who introduced us to the interesting world of medical statistics. Leiv explained the general principles as well as how to perform each of the analyses. We have come to understand that statistics is not an exact science, but requires judgement and qualified decisions—as does medicine.

At the very beginning of this project, we made contact with Holger Ursin and Hege Eriksen, then in charge of the research network for back pain at the University of Bergen. They invited us to the "Geilo meetings" where we made contact with other colleagues interested in back pain research.

The Research Department at Sykehuset Østfold has been very supportive. Special thanks go to Famara Sanyang, Marianne Eckhoff, and Morten Jacobsen. The staff at the Medical Library have provided innumerable articles and excellent service.

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3 ABBREVIATIONS

CI	Confidence interval
CT	Computed tomography
HSCL	Hopkins Symptom Check List
MRI	Magnetic resonance imaging
MSBQ	Maine–Seattle Back Questionnaire
NSBR	National Sickness Benefit Register
OR	Odds ratio
SBI	Sciatica Bothersomeness Index
SD	Standard deviation
SEM	Standard error of measurement
SFI	Sciatica Frequency Index
SHC	Subjective health complaint

4 LIST OF PAPERS

Paper I

Grøvle L, Haugen AJ, Keller A, Natvig B, Brox JI, Grotle M. Reliability, validity, and responsiveness of the Norwegian versions of the Maine–Seattle Back Questionnaire and the Sciatica Bothersomeness and Frequency Indices. *Spine*. 2008;33:2347–2353.

Paper II

Grøvle L, Haugen AJ, Keller A, Natvig B, Brox JI, Grotle, M. The bothersomeness of sciatica: Patients' self-report of paresthesia, weakness and leg pain. *Eur Spine J*. 2010;19:263–269.

Paper III

Grøvle L, Haugen AJ, Ihlebaek CM, Keller A, Natvig B, Brox JI, Grotle M. Comorbid subjective health complaints in patients with sciatica: A prospective study including comparison with the general population. *J Psychosom Res*. 2011;70:548–556.

Paper IV

Grøvle L, Haugen AJ, Keller A, Natvig B, Brox JI, Grotle M. Poor agreement found between self-report and a public registry on duration of sickness absence. *J Clin Epidemiol*. 2012 Feb;65(2):212-8.

Paper V

Grøvle L, Brox JI, Haugen AJ, Keller A, Natvig B, Grotle M. Prognostic factors for return to work in patients with sciatica. *Submitted 2011*.

5 INTRODUCTION

5.1 The sciatica concept

The word 'sciatica' is derived from the Greek word ischión meaning hip-joint and the Latin word ischiadicus meaning hip pain. In the 18th century, sciatic nerve pain was differentiated from arthritic hip pain[1] and thereafter, 'sciatica' became the established term for pain radiating from the lower back or buttock into the leg. About 90% of cases of sciatica are caused by a herniated intervertebral disc in the lumbar column. Other lesions affecting the integrity of the lumbo-sacral nerve roots (L4–S3) or the sciatic nerve may produce the same clinical picture, including lumbar canal or foraminal stenosis, tumours, cysts, haemorrhage, abscesses, fractures, and some less common conditions.

'Sciatica' is the most commonly used term in the literature, but 'lumbar disc syndrome', 'lumbar disc protrusion causing radiculopathy', and 'lumbo-sacral radicular syndrome' are also used. In addition to back and leg pain, muscle weakness and sensory disturbances may occur. The condition can vary from short, single episodes to a remitting or permanent course over months or years. A rare but potentially devastating complication is cauda equina syndrome[2], involving impaired bladder, bowel, and genital dysfunction caused by the involvement of multiple sacral and lumbar nerve roots.

This thesis focuses on patients with radiating pain and neurological symptoms caused by a lumbar disc herniation. We have chosen to use the term 'sciatica' because this is the term most commonly used in both the scientific literature and daily clinical practice.

5.2 Epidemiology

No epidemiological studies of sciatica in the general population based on radiological findings have been published. Therefore, the exact incidence or prevalence rates are unknown. However, studies of the general population have estimated the occurrence of sciatica based on symptoms and clinical examinations. For example, in a study of the general Finnish population, the point prevalence of sciatica was estimated to be 4.8%[3]. In another epidemiological study based on clinical diagnoses made by physicians, the lifetime cumulative incidence was estimated to be 12.2%[4]. In other studies, questionnaires or interviews have been used to define cases of sciatica[4-7]. The use of a wide spectrum of definitions of sciatica has resulted in large variations in prevalence estimates[7]. The one-year incidence of cauda equina syndrome is believed to be 1–3/100,000 persons[8].

In Norway, a diagnosis of low back pain accounted for approximately 13% of all patients on sick leave and 17% of all compensation days in 1995/1996[9]. Of these claimants, 30% had radiating pain. In a general working population in Sweden[10], approximately 5% sought health care for a new episode of low back pain during a three-year period, and 25% of these suffered radiating pain below the knee and had a positive straight leg raising test. Compared with patients with non-specific low back pain, patients with radiating pain generally report more severe pain, have longer absences, and lower rates of return to work[9, 11-15]. Because of the high social and economic burdens imposed by sciatica, it would be useful to be able to identify those workers who are at high risk of continued occupational disability[9, 15, 16].

5.3 Pathoanatomy and pathophysiology

The disc is composed of a central core, the 'nucleus pulposus', which is surrounded by a thick outer ring of fibrous cartilage, called the 'annulus fibrosus'. Through the years, the annulus becomes stiffer and weaker[17], followed by the appearance of nuclear clefts and annular tears[18] that permit the gelatinous tissue of the nucleus to be displaced into the annulus, forming herniations. Disc herniations can range from protrusions (when the outer annular lamellae remain intact) to extrusions (when the annular lamellae are ruptured) to sequestrations (in which the herniation is completely detached from the body of the disc)[19]. Studies of twins have shown a substantial genetic predisposition to disc degeneration[20].

Within the cauda equina, the nerves run downwards and laterally before exiting their respective foramina. At their emergence from the dural sac, the sciatic nerve roots are fastened by ligamentous attachments to the vertebral body and the subjacent pedicle within the foramen. Therefore, a disc herniation may cause stretching and compression of the nerve root and dorsal root ganglion. A posterior lumbar disc herniation usually affects the root of the nerve exiting at the level below the herniation, i.e., a herniation between the L5 and S1 vertebrae will usually affect the S1 nerve root. Herniations extending far laterally may affect the root at the same level and large herniations may affect more than one nerve.

It has been shown that the stimulation of compressed roots causes pain, whereas the manipulation of normal roots does not[21]. Rydevik[22] and Olmarker[23] have reported that compression was associated with the formation of oedema and reduced the propagation of electrical impulses in the nerve root. They also showed that the application of tissue from the nucleus pulposus to the root induced inflammatory reactions[24]. A histological evaluation of herniated disc tissue revealed prominent infiltration of inflammatory cells, most markedly

macrophages and cytokines. Cytokines promote lymphocyte activation, which further recruits macrophages and activates them to phagocytosis and the secretion of proteolytic enzymes[25]. The combination of compression and inflammation is now widely accepted as an essential pathophysiological factor in sciatica[26, 27]. Long-standing root compression may result in axon loss and intra- and extraneural fibrosis. All types of fibres in the nerve roots may be affected.

Longitudinal magnetic resonance imaging (MRI) studies have indicated a reduction in the size of symptomatic herniations over time, especially extrusions and sequestrations[28-30]. The resorption of the herniated disc material is thought to result from the inflammatory process *via* macrophage activation and phagocytosis[31].

MRI examinations of people without back pain commonly show disc bulges and protrusions; whereas extrusions and sequestrations are rare[32]. The prevalence of clinically silent herniations has been reported to be about 20%–30%[32-34]. Why some herniations produce symptoms and others do not is not well understood. Therefore, we clearly must extend our knowledge of the pathoanatomy and pathophysiology of sciatica.

5.4 Diagnosis and assessment

Diagnosing sciatica caused by lumbar disc herniation relies on history taking, a physical examination, and imaging. However, the weak associations between MRI findings and self-reported symptoms[35, 36] mean that diagnosis is not always a straightforward process. The clinical assessment of sciatica often reveals a complexity of self-reported symptoms and disability, together with other subjective health complaints (SHCs).

5.4.1 Physical examination and imaging

Physical examination and imaging focus on identifying the anatomical structure involved. The symptoms of sciatica include radiating pain with or without sensory disturbance or weakness. The pain is typically described as ‘sharp’, ‘lancinating’, or ‘burning’ and is often exacerbated by coughing or sneezing. Clinical signs of nerve dysfunction support the diagnosis. Such signs include an abnormal straight leg raising test and reduced dermatomal sensibility, muscular strength, or tendon reflexes. The examination of a patient suspected of cauda equina syndrome includes testing both the bladder and anal functions.

A diagnosis of sciatica (caused by disc herniation) requires the identification of the herniation on MRI or computed tomography (CT) at a site and level corresponding to the symptoms and clinical findings. CT and MRI show equal capacities to identify lumbar disc herniations[37, 38] and can classify them according to morphology, volume, or location in the

sagittal or horizontal plane[19]. However, the associations between self-reported symptoms, the size of the herniation, and whether it is a protrusion, extrusion, or sequestration are weak[35, 36]. Electrophysiological tests do not provide diagnostic information beyond that obtained from the history, the imaging results, and the clinical examination[39].

Although guidelines for the classification of disc abnormalities exist[19], they are not always followed in clinical practice. Radiologists vary according to their interests and experience, and images vary in how technically demanding they are to interpret. Therefore, potential disc pathology based on MRI or CT images may be described differently by different radiologists. These factors influence the diagnosis of sciatica and therefore may affect both the care of the individual patient and the selection of patients for research purposes.

5.4.2 Symptoms and disability

There exists no consensus on the exact symptoms that must be present or the outcome that should be used for the diagnosis of sciatica. When planning the current study, no sciatica-specific questionnaires for Norwegian-speaking patients existed. Clinical research on sciatica has generally been performed with outcome measures intended for patients with low back pain, with a supplement addressing leg pain intensity[40, 41]. In 1995 and 2003, as part of the large observational Maine Lumbar Spine Study[42], three sciatica-specific instruments were introduced. These included the Sciatica Bothersomeness Index (SBI), the Sciatica Frequency Index (SFI)[43], and the Maine–Seattle Back Questionnaire (MSBQ)[44].

The SBI and SFI both address four sciatica symptoms: 1) leg pain; 2) numbness or tingling in the leg, foot, or groin; 3) weakness in the leg/foot; and 4) back or leg pain while sitting. Each scale produces a total score by summing the scores across the four symptoms. They also provide an opportunity to investigate each symptom using a standardized methodology.

The 12-item MSBQ is an abbreviated version of the Patrick-modified 23-item Roland–Morris Disability Questionnaire[43, 45] designed for patients with sciatica and lumbar spinal stenosis. It represents an attempt to minimize the respondent burden associated with the longer 23-item version.

However, the validity, reliability, and responsiveness of the three measures have not been replicated outside the Maine Lumbar Spine Study. By using the MSBQ and the two sciatica indices in the present study, we could exploit the opportunity to compare our results with the results of the Maine Study.

5.5 Comorbid subjective health complaints

Among patients who present with low back pain, probably as many as 90% will have non-specific symptoms, defined as symptoms without a clear specific cause[5]. Several studies have shown that patients who develop chronic non-specific low back pain report high rates of coexisting mental and physical conditions[46-48]. Many of these conditions represent SHCs, such as headache, muscular pain, dyspnoea, gastrointestinal discomfort, anxiety, and sadness, and several are referred to as unexplained, functional, or somatization symptoms[49-51]. However, whether this elevated comorbidity is a cause, an effect, or just a concomitant phenomenon of chronic low back pain is unknown. It has been suggested that patients with chronic low back pain represent a generally frail subgroup of people predisposed to developing chronic pain[52] and/or symptoms of somatization[53]. Most of the relevant research has either focused on patients with non-specific chronic low back pain or has not distinguished between patients with specific and non-specific back pain. This distinction may be important because the mechanisms underlying the corresponding comorbidity might differ. Sciatica caused by a lumbar disc herniation represents the most common cause of specific low back pain. To our knowledge, the only study to report comorbidity in sciatica was a Finnish population study that showed a weak association with cardio-vascular, respiratory, mental diseases, and some musculoskeletal conditions[54].

The majority of research in this field has so far been cross-sectional; few prospective studies exist[52]. Therefore, knowledge of the comorbid health complaints in a well-defined longitudinal cohort of patients with sciatica might offer more insight into the issue of comorbidity in back pain. Comparing the prevalence of other health complaints in a cohort of sciatica patients with that in the general population may also provide useful information. A higher prevalence in sciatica patients than in the general population might suggest that these symptoms are secondary to sciatic pain and disability. Exploring this topic was one of the main intentions of the present study.

5.6 Treatment

The usual treatment for sciatica consists of pain-relieving medications. Many patients also receive physical therapy, perform exercises, etc. However, no conservative therapies, such as bed rest, traction, manipulation, etc., have been shown to affect the long-term prognosis[55]. Non-steroidal anti-inflammatory drugs[56] and the systemic or epidural administration of glucocorticosteroids have shown conflicting or negative results in randomized trials[57-59].

Biological agents that target tumor necrosis factor α, a cytokine involved in the inflammatory process, have also been disappointing[60-62]. Chemonucleolysis, the intradiscal injection of a proteolytic enzyme, was only slightly more effective than a placebo[63, 64], but less effective than discectomy, and is no longer commercially available.

During the last 80 years, the surgical removal of the herniated disc material has become an increasingly popular procedure[1]. About six operations per 10,000 inhabitants are performed in Norway each year[65]. However, despite its popularity, the effect of surgical therapy has not been firmly established.

When the present study was planned, only one randomized study of the effect of surgical therapy had been performed. In a landmark Norwegian study commenced in 1970[66], Weber randomized patients with uncertain indications for surgery to either treatment with conservative care or surgery. One-quarter of the patients in the conservative group were treated surgically during the first year. At the one-year follow-up, 87% of the surgical and 82% of the non-surgical patients reported a good or fair result. At the four- and 10-year follow-ups, about 90% of the patients in both groups reported a good or fair result. The results of the few other randomized trials that have been performed[67-69] have been difficult to interpret because of non-adherence to the assigned treatment groups. In the SPORT trial[69], only 60% of those who had initially been randomized to surgery were actually operated on, whereas 45% of those assigned to conservative therapy underwent surgery. Significant advantages of surgery were found in the as-treated analysis but not in the intention-to-treat analysis. Currently, surgical discectomy is considered to relieve acute pain and pain-related disability in the short term (i.e., for some months), but does not seem to improve the long-term prognosis[70, 71].

5.7 Sciatica and occupational disability

Despite the social and economic burdens of sciatica, surprisingly little is known about the prognostic factors for occupational disability. Two papers, one originating from the SPORT study[72, 73] and one from the Maine Lumbar Spine Study[74], have dealt with the prognosis for returning to work. Their main focus was the effect of the workers' compensation status of the patients. In neither study was the patient's workers' compensation status significantly related to his/her return to work at the two- or four-year follow-up, respectively. The results of the multivariate analysis in the Maine Study indicated that younger age, better self-perception of general health, and less severe low back pain at baseline were associated with higher rates of return to work at four years[74]. Certain psychological factors, such as anxiety, depression, and

pain-related fear, have been associated with occupational disability in patients with non-specific low back pain[75], but their roles in sciatica have not been established[76, 77].

A few authors have investigated the factors predicting work-related outcomes in patients treated surgically[78]. In a Norwegian study, Graver et al.[77] reported that female sex, short height, a long period of sickness absence, and physically strenuous work reduced the likelihood of returning to work one year after surgery. Donceel and Du Bois[79] found that pain-related disability, depression, somatization, recent life events, and the patient's own prediction were associated with the capacity to work at the one-year follow-up, as assessed by the physicians in a sickness benefits fund. In a small study, Schade et al.[76] reported that preoperative pain level, depression, and occupational mental stress predicted self-reported return to work two years after surgery. A Finnish study[80] indicated that when the patients' prognostic factors were assessed two months after the operation, leg pain, pain-related disability, and poor motivation for work were related to the number of self-reported sickness absences.

In planning the present study, it became obvious that more research is required into occupational disability in sciatica patients. Among several outcomes related to occupational disability, the *time to return to work (time lost)* and *working/not working* are important factors. The first can be used as an indicator of the cost of the illness and the second as an indicator of chronicity[15, 81]. In this study, we intended to use patient-reported data, but the validity of self-reported sickness absence data is not well established. The few studies that have compared sickness absence data obtained by self-report with data obtained from a register have only been performed in occupational[82-90] or general population settings[91], with few occurrences and short absences. Data obtained in such settings might not be applicable to clinical settings with high absence rates, like those of the sciatica patients in the present study. Therefore, before self-reported sickness absence data are used as an outcome measure, their validity in a clinical hospital setting must be investigated more thoroughly.

Because all Norwegians are covered by the National Sickness Benefit Register (NSBR), it seemed sensible to start by comparing self-reported data with data obtained from this register.

To qualify for sickness benefits in Norway, occupational disability must be documented with a doctor's sick leave certificate, which is submitted to the NSBR. If the person is still unable to work after one year, he or she may be entitled to a rehabilitation allowance or disability benefits. Employees can also certify themselves sick up to four periods

a year, with each absence comprising a maximum of three consecutive days. Self-certified absence is not registered by the NSBR.

6 RESEARCH AIMS

The general aim was to assess self-reported symptoms, health complaints, and return to work in patients with sciatica and disc herniation. The specific aims were:

1. To translate, culturally adapt, and test the measurement properties of three self-reported outcome measures especially designed for patients with sciatica (paper I).

2. To investigate how sciatica patients rate the severity of their sensory disturbances and muscle weakness relative to their pain (paper II).

3. To test the hypothesis that the occurrence of subjective health complaints among patients with sciatica is higher than in the normal population and to determine whether a change in the severity of sciatica is associated with a corresponding change in the number of subjective health complaints (paper III).

4. To investigate how well sickness absence data obtained by self-report agree with data from a public registry (paper IV).

5. To identify prognostic factors for return to work during a two-year follow-up (paper V).

7 MATERIALS AND METHODS

7.1 Designs

The present thesis is based on data from a multicentre, observational cohort study. In paper I, we used a cross-sectional test–retest design. In paper II, we used the baseline data in a cross-sectional design. In paper III, both a cross-sectional and a longitudinal design were used: first, the baseline data from the patient cohort were compared with a historical sample from the general population in a case–control study; and second, the longitudinal data from the patient

cohort up until the one-year follow-up were used. In papers IV and V, we used longitudinal data from the cohort study. Table 1 shows the sources of the data that were used in each of the papers.

Table 1. Data sources according to paper.

	Data source						
	Patient cohort					General population sample	National Sickness Benefit Register
	Baseline	3 months	6 months	1 year	2 years		
Paper I	×						
Paper II	×						
Paper III	×	×		×		×	
Paper IV	×	×	×	×	×		×
Paper V	×				×		×

7.2 Study samples

7.2.1 Patients

All patient data were obtained from a prospective cohort study with a two-year follow-up period, from patients with sciatica and disc herniation referred to the back clinics at four hospitals in south-eastern Norway (Sykehuset Østfold, Sørlandet Sykehus, Ullevaal Universitetssykehus, and Sykehuset Innlandet). From January 2005 to December 2006, a total of 466 patients with a mean age of 43.6 years (range 18.0–78.3 years) was enrolled, 42.5% of whom were women.

The patients included were 18 years of age or older, had radiating pain or paresis below the knee, and an ipsilateral lumbar disc herniation at the corresponding level verified by MRI or CT. The exclusion criteria were pregnancy, spinal fracture, tumour, infection, previous surgery to the affected disc, and inability to communicate in written Norwegian. The patients were invited to participate in the study by the clinic staff.

7.2.2 General population sample

To compare the occurrence of SHCs in the sciatica patients with that in the general population, an historical sample was used of 1,014 persons who had been interviewed by

telephone in 2003 by the opinion poll firm Norwegian Gallup. This data set was provided by Camilla Ihlebæk[92], one of the co-authors of paper III. To ensure a representative sample of the adult Norwegian population, a standard procedure of computer-assisted telephone interviewing (random digit dialling) was used. The sample was drawn randomly, using telephone numbers in proportion to the population in each municipality, and the respondent in each household was selected by interviewing the person who had had the most recent birthday, with up to five recalls if the initial attempts were unsuccessful. To ensure comparability with the age span of the sciatica cohort, respondents aged < 18 years and > 79 years were excluded from the data set, producing a sample of 928 persons.

7.3 Patient assessment procedure

On the day of inclusion, the participants were given a baseline questionnaire at the clinic, and a clinical examination was conducted by a physician or physiotherapist. Follow-ups were conducted at three, six, 12, and 24 months thereafter with mailed questionnaires, which were completed at home and returned in prepaid envelopes. Patients who had not responded two weeks after the scheduled date were contacted by telephone or a text message. A reminder letter was sent to non-responders if no reply was obtained after three weeks. The follow-up assessments included the outcome measures used at baseline and questions about any treatment received since the previous follow-up.

To establish the test–retest reliability of the MSBQ, SBI, and SFI, 87 patients at Sykehuset Østfold repeated the questionnaires after a two-day interval and returned them by mail (paper I).

7.4 Treatment

Study participation did not involve any specific type of intervention; the patients received treatment as usual at each centre. Generally, the patients were advised to stay active and use pain medications if necessary. In cases of severe symptoms, surgery was performed at the discretion of each centre. The date of the operation was recorded at the next follow-up.

7.5 Patient-reported outcome measures

7.5.1 Sciatica symptoms (papers I and II)

The SBI and SFI both address four symptoms: (1) leg pain; (2) numbness or tingling in the leg, foot, or groin; (3) weakness in the leg/foot; and (4) back or leg pain while sitting. Each symptom is scored on a scale from 0 to 6. The SFI scoring categories are *not at all*, *very*

rarely, *a few times*, *about half the time*, *usually*, *almost always*, and *always*. The SBI scoring categories are 0 (*not bothersome*), 3 (*somewhat bothersome*), and 6 (*extremely bothersome*). Each scale provides a total score from 0 to 24 when the individual scores are summed across the four symptoms. The indices are intended to measure symptoms that occurred during the immediately previous week.

7.5.2 Pain-related disability (paper I)

The MSBQ consists of 12 items that address impairment and activity limitations attributable to leg or back pain, within the same day. Each item is scored as *yes* (1) or *no* (0), yielding a range of possible scores from 0 to 12. Higher scores indicate greater disability.

7.5.3 Comorbidity (paper III)

The Subjective Health Complaints Inventory[93] is a list of 29 items of common somatic and psychological complaints. Respondents are asked to grade the intensity of each complaint experienced in the previous month on a four-point scale: *not at all* (0), *a little* (1), *some* (2), and *severe* (3). In this thesis, the responses to each complaint were dichotomized into *absent* (0) or *present* (1, 2, or 3) and the SHC number was calculated by summing all the complaints reported as present. Two of the items, *low back pain* and *leg pain during exercise*, are closely related to sciatica and were excluded, reducing the maximum obtainable SHC number from 29 to 27.

7.5.4 Sickness absence (paper IV)

At each follow-up, the patients responded to the question: *Since the previous follow-up, have you been on sick leave (including partial sick leave) or rehabilitation because of back pain/sciatica? If yes, state the number of weeks. If less than one week, state 0*. Patients were not asked to report self-certified sick leave.

7.5.5 Current work status (paper V)

The self-reported current work status included the categories: *full-time work*, *partial sick leave*, *complete sick leave*, *rehabilitation*, *disability pension*, *student*, *job seeker*, *old-age retirement*, or *homemaker*.

7.6. The National Sickness Benefit Register

7.6.1 Sickness absence (paper IV)

Data obtained from the NSBR included the commencement and cessation dates of sickness absence, rehabilitation, and disability benefits. In this thesis, the NSBR's records of sickness absence and rehabilitation allowance were regarded as the reference standard for sickness absence. Diagnoses on the sickness absence certificates indicating back pain or sciatica according to the International Classification of Primary Care [27] were used: L02 (back symptom/complaint), L04 (low back symptom/complaint), L84 (back syndrome without radiating pain), and L86 (back syndrome with radiating pain). The *duration* of sickness absence was calculated in full weeks by subtracting the commencement date from the cessation date. The end of each follow-up period was defined as the date the questionnaire was returned by the patient. In cases of more than one absence per follow-up period, the durations of all the absences were summed.

7.6.2 Time to sustained return to work (paper V)

For patients who, at the time of inclusion and according to the NSBR, were receiving sickness benefits or rehabilitation allowances because of back pain/sciatica, *being off the national register list* was used as a proxy measure for 'returned to work'. 'Sustained return to work' was chosen to avoid misclassifications that might arise from recurrences of sickness absence[94, 95], and was defined as the number of calendar days from inclusion to the first period of >60 days during which no benefits were received from the NSBR.

7.7 Independent variables

The independent variables used in the present study included demographic data, clinical data, and patient-reported outcomes. A summary of these independent variables is given in Table 2.

The patient-reported outcomes included the work subscale of the Fear-Avoidance Beliefs Questionnaire[96, 97], which is intended to assess fear avoidance beliefs regarding work (here called 'fear avoidance–work'). Pain-related fear of movement/re-injury was measured with a 13-item version of the Tampa Scale for Kinesiophobia[98, 99]. It has been suggested that fear avoidance beliefs are an obstacle to recovery in populations of patients with low back pain[100].

Emotional distress was assessed with the Hopkins Symptom Check List-25[101], which includes 10 items that assess anxiety and 15 items that assess depression. Each item has four response categories, ranging from *not at all* (1) to *extremely* (4), referring to symptoms during the immediately previous week. The score is calculated as the sum of all the item scores divided by the number of items answered. The usefulness of the Hopkins Symptom Check

List-25 as a screening tool has been demonstrated in several settings[102-105], and a clinical cut-off of 1.75 is commonly used to define symptomatic cases[102, 106, 107]. In Norwegian population studies, 14%–20% of females and 8%–9% of males have reported values of ≥ 1.75[108, 109].

As a measure of the 'generic' health status, the SF-36[110] was used. Here, 'generic' means that it does not target specific disease groups. The SF-36 yields an eight-scale profile of physical functioning, role limitations attributable to physical problems, bodily pain, general health, vitality, social functioning, and role limitations attributable to emotional and mental health problems. Each domain is scored from 0 (*poor health*) to 100 (*optimal health*). The SF-36 is useful in comparing general and specific populations, comparing the relative burdens of diseases, and differentiating the health benefits produced by different treatments.

Table 2. Summary of independent variables and scoring formats.

Independent variables	Scale
Demographic	
Age	Years
Sex	
Married or cohabitant	Yes/no
Education	Years
Current smoker	Yes/no
Duration of current sciatica episode	Weeks
Duration of back problems	< 1, 1–5, > 5 years
Number of previous sciatica episodes	0, 1, 2, 3–4, 5–10, > 10
Clinical examination findings	
Straight leg raising test (< 60°)	Normal/abnormal
Sensory (dermatomal light touch)	Normal/abnormal
Muscular performance*	Normal/abnormal
Reflexes (patellar or Achilles)	Normal/abnormal
Patient-reported outcomes	
Fear Avoidance Beliefs Questionnaire–work[96, 97]	0–42
Tampa Scale of Kinesiophobia[98, 99]	13–52
Emotional distress[101, 111]†	0–4
Back pain (mm on a visual analogue scale)	0–100
Leg pain (mm on a visual analogue scale)	0–100

Generic health status (SF-36)[110]‡	0–100
Use of analgesics	Daily, weekly, less than weekly, no use
Use of tranquillizers	Daily, weekly, less than weekly, no use
Sciatica global change scale	Completely gone, much better, better, a little better, no change, a little worse, much worse

* Any of: single limb stance, tiptoe or heel walking, supine knee or ankle flexion/extension, big toe extension.

† Assessed with the Hopkins Symptom Check List-25.

‡ Included subscales of vitality, bodily pain, general health, social functioning, physical functioning, role physical, role emotional. Higher values indicate better health.

7.8 Statistics

The sample size calculation for this study was based on the intention to perform a prospective cohort study to investigate the impact of approximately 20 prognostic factors on successful or unsuccessful outcomes after one and two years. It has been suggested that for prognostic studies, at least 10 outcome events are required for each factor studied[112]. Because there was no consensus regarding an optimal definition of 'outcome events' for sciatica when this study was planned, we could not provide a precise sample size estimate *a priori*. However, based on the previous Maine Lumbar Spine Study, we expected that surgical treatment would be necessary for 30% of the patients and that 30% of those who were surgically treated and 50% of those who were not surgically treated would not experience a successful outcome at one year[113]. If 50% of the sample experienced poor outcome events, a sample of 400 patients would provide sufficient statistical power to test approximately 20 prognostic factors.

All analyses were performed with different versions of SPSS (SPSS, Inc., Chicago, IL). Generally, findings with *P* values of < 0.05 were regarded as significant. In paper V, multivariate models were built by including potential prognostic factors with *P* values of < 0.2 in the univariate analyses. The statistical methods used in this thesis are presented in Table 3.

Table 3. Statistical methods according to purpose and paper.

Method	Purpose in the present study	Paper
95% limits of agreement[114]	Provides an interval within which 95% of differences between two measurements are expected to lie	I, IV

Area under the receiver operating characteristic curve[115]	A measure used to correctly discriminate according to the external criterion	I
Bland Altman plot[114]	Illustrates the agreement between two measures, either in a test–retest situation or when comparing two methods	I, IV
χ^2 test for trend[116]	Compares ordered categorical (ordinal) variables in two independent samples	II
χ^2 test[116]	Compares categorical variables in two independent samples	II
Cohen's kappa[117]	Assesses chance-corrected percentage agreement in a 2×2 table	IV
Cox's proportional hazard regression analysis[118]	Assesses the effects of several variables on the time to occurrence of a dichotomous variable	V
Cronbach's alpha[119]	Assesses the internal consistency, i.e., the intercorrelation of items on unidimensional scales	I
Factor analysis[120]	Assesses the underlying latent factors or dimensions in a scale or questionnaire	I
Intra-class correlation coefficient[121]	Assesses the test–retest reliability of a questionnaire with continuous scores	I
Linear regression[120]	Determines the contribution of one (univariate) or several (multivariate) factors to a single outcome with an interval or continuous distribution	II
Logistic regression[120]	Determines the contribution of one (univariate) or several (multivariate) factors to a single, binary outcome	III, V
Mann–Whitney U test[116]	Compares continuous or ordinal variables with non-normal distributions in two independent samples	I
McNemar's test[116]	Compares binary variables in one sample obtained at two different time points	III
Nagelkerke R^2[120]	Measures how well the independent variable(s) in a logistic regression explains the outcome	V
Paired *t* test[116]	Compares observations in one sample obtained at two different time points; requires differences to be normally distributed	III
Percentage agreement[122]	Determines the percentage of occasions upon which two methods agree whether an outcome has occurred or not, based on a 2×2 table	IV
R^2[120]	Measures how well the independent variable(s) in a linear regression explains the outcome	II

Receiver operating characteristic curve analysis[116]	A graphical plot of the true positive rate (sensitivity) *vs* the false positive rate (1 – specificity) for an external binary criterion for each of all possible cut points on a continuous scale	I
Spearman's rho[116]	Quantifies the association between two variables with non-normal distributions by rank correlation	I, III, IV
Standard error of measurement (SEM)[123]	Assesses measurement error in test–retest reliability using an ANOVA repeated-measures procedure	I
Standardized response mean[124]	Measures the responsiveness of a questionnaire by calculating the ratio of the mean change to the standard deviation of that change	I
Student's *t* test[116]	Compares normally distributed continuous variables in two independent samples	II
Variance inflation factor[120]	Measures multicollinearity, i.e., the effect other independent variables have on the standard error of a regression coefficient	V
Wilcoxon's matched pairs signed-rank sum test[116]	Compares observations in one sample obtained at two different time points; does not require differences to be normally distributed	III

7.9 Ethics

Written informed consent was obtained from all participating patients. The protocol was approved by the Regional Committee for Medical Research Ethics and the Ombudsman for Privacy in Research at the Norwegian Social Science Data Services.

8 SUMMARIES OF RESULTS

In the first part of the study (paper I), the reliability, validity, and responsiveness of the Norwegian versions of the MSBQ, SBI, and SFI in sciatica patients were assessed. We used baseline data from 466 patients, 87 of whom participated in a test–retest study. The completion time was 1–2 minutes for the MSBQ and 30 seconds for both the SBI and the SFI. The intra-class correlation coefficients varied between 0.86 and 0.90. The values for Cronbach's alpha were 0.74, 0.70, and 0.65 for the MSBQ, SBI, and SFI, respectively. The measurement errors constituted 26% of the total MSBQ score range, 22% of the SBI score range, and 27% of the SFI score range. Compared with the MSBQ, the two sciatica indices better discriminated the patients with normal clinical findings from those with abnormal ones,

but correlated less strongly with measures of pain and physical functioning. All standardized response means were ≥ 1.3 and all the areas under the receiver operating characteristic curves were ≥ 0.75.

We then investigated how patients rated the bothersomeness of paraesthesia and weakness compared with that of leg pain, and how these symptoms were associated with the socio-demographic and clinical characteristics of the patients (paper II). The cross-sectional SBI data obtained at baseline from 411 patients with clinical signs of radiculopathy were used. The mean scores (standard deviation, SD) were 4.5 (1.5) for leg pain, 3.4 (1.8) for paraesthesia, and 2.6 (2.0) for weakness. Women reported approximately 10% higher bothersomeness scores for all three symptoms than men. In the multivariate models, more severe symptoms were associated with lower physical function and higher emotional distress. The clinical findings for muscular paresis explained 19% of the variability in self-reported weakness; the sensory findings explained 10% of the variability in paraesthesia; and the straight leg raising test explained 9% of the variability in leg pain.

To determine whether patients with sciatica report higher rates of SHCs than expected, the patients were compared with a historical general population sample (n = 928) (paper III). The odds ratios (ORs) for the sciatica patients in reporting SHCs at baseline were significantly elevated for 15 of the 27 items compared with the general population sample. The mean (SD) number of SHCs was also significantly higher in the patient group (7.5 [4.4]) than in the population sample (5.2 [4.4]; $P < 0.01$). The number of SHCs decreased to normal levels in those patients who fully recovered from their sciatica during the one-year follow-up period. Among those with persistent or worsening sciatica, the number of SHCs increased to a level almost double that of the general population.

Following an amendment to the protocol, all patients included in the sciatica cohort after October 2005 (n = 227) gave their consent for us to obtain their sickness absence data from the NSBR. To assess how well the sickness absence self-reports agreed with the registry data, postal questionnaires covering recall periods of three, six, and 12 months and the data from the NSBR were used (paper IV). Compared with the registry data, the patients overestimated the *duration* of their sickness absences by 2.4 weeks (95% CI 1.1–3.7) and 3.2 weeks (95% CI 0.1–6.3) during the three- and six-month recall periods, respectively, and underestimated them by 0.8 weeks (95% CI –6.5 to 4.9) during the 12-month recall period. The 95% limits of agreement were generally wide, varying from –12.5 to 17.3 weeks for the three-month recall period and from –38.8 to 37.2 weeks for the 12-month period. For the three-, six-, and 12-month recall periods, 48.1%, 28.8%, and 27.3% of the patients,

respectively, reported a sickness absence *duration* that differed by ≤ 1 week from that recorded in the registry. The percentage agreement on sickness absence *occurrence*, i.e., whether sickness absence had occurred or not, was > 85% for all three recall periods.
To identify prognostic factors for return to work, two patient samples (A and B) were used (paper V). Sample A comprised 237 patients who, at baseline, reported being on partial or complete sick leave, or were undergoing rehabilitation because of back pain/sciatica, and the self-reported return to full-time work at the two-year follow-up was used as the outcome. Sample B comprised 125 patients who, according to the NSBR, at the time of their inclusion in the study were receiving sickness benefits or a rehabilitation allowance because of back pain/sciatica. The outcome was the time to first sustained return to work, defined as the number of calendar days from inclusion to the first period of >60 days during which no benefits were received from the NSBR.

At the two-year follow-up, approximately 25% of the patients were still out of work. In sample A, younger age, better baseline general health, lower sciatica bothersomeness, less fear avoidance–work, and a negative straight leg raising test result were significantly associated with a higher probability of having returned to full-time work after two years. Surgery was not significantly associated with this outcome. In sample B, a previous history of sciatica, a duration of the current sciatica episode of > 3 months, higher baseline sciatica bothersomeness, higher fear avoidance–work, and greater back pain were significantly associated with a longer period before a sustained return to work. Surgery was negatively associated with the time to a sustained return to work in both the univariate (hazard ratio 0.60; 95% CI 0.39–0.93; $P = 0.02$) and multivariate analyses (hazard ratio 0.49; 95% CI 0.31–0.79; $P = 0.003$).

9 GENERAL DISCUSSION

This thesis demonstrates that patients with sciatica report considerable health problems in addition to sciatica-specific symptoms and disability. A number of both generic and sciatica-specific symptoms were significant prognostic factors for return to work after two years. These results also contribute important knowledge about the methodological issues involved in the analysis of sciatica.

The main results will be discussed with respect to the methodological considerations, including the design, study samples, representativity, the validity of prognostic and outcome measures, and statistical methods. Finally, the main results will be compared with other currently relevant evidence.

9.1 Methodological aspects

9.1.1 Study designs and general considerations

In this thesis, a multicentre cohort study was used because one of the main goals was to investigate prognostic factors[112, 125]. In cohort studies, the selection of the study subjects and their loss to follow-up may create bias[116], especially if the loss to follow-up is related to the outcome[126]. However, in the present study, the loss to follow-up was only 12% at one year and 18% at two years of follow-up, suggesting that loss to follow-up cannot be considered an important source of bias here.

In cross-sectional studies, all the information is collected at the same time, so loss to follow-up or recall bias is not a concern. The cross-sectional design is useful in identifying associations, but cannot be used to decide cause and effect. This limitation should be taken in consideration in the interpretation of the studies reported in papers I–III, in which cross-sectional designs were used.

9.1.2 Study samples and representativity

To optimize the external validity of the prospective cohort, we included a relatively large number of patients and used a multicentre design. In general, we consider our patient sample to be representative of the patients referred to secondary care with sciatica in the south-east region of Norway. The inclusion criteria in the present study were formulated to allow patients with paresis but without radicular pain to be included. However, this group turned out to be very small, constituting only 1.5% of the total cohort. Other sciatica studies have differed on this point. In the Maine Lumbar Spine Study, patients were accepted who "had sciatica" according to orthopaedic surgeons or neurosurgeons. In Weber's studies of the effects of piroxicam[56] and surgery[66] on sciatica, only patients with a positive straight leg raising test were included. In two trials reported after the start of the present study, Peul[127] included patients both with and without a mild neurological deficit, whereas the SPORT study[128] required a positive nerve-root-tension sign (positive straight leg raising or femoral tension sign). The use of different inclusion criteria might have caused differences in the

patient samples across these studies, and should be taken into account when comparing our result with those of other cohorts.

The response rate in the present study was generally high, and all follow-up rates were above 80%, a cut-off commonly used to separate "high quality" from "low quality" studies[116, 126], strengthening the generalizability of our results. The patients who did not respond at the 2 year follow up were younger, more likely to be smoking, to have a positive straight leg raising test, to report more back pain, lower general health and more emotional distress at baseline than those who completed the 2 year follow-up.

A limitation in patient recruitment was the incomplete recording of patients who were eligible according to the inclusion/exclusion criteria, but for some reason were either not invited or declined to participate. Another minor limitation was that only patients recruited from Sykehuset Østfold participated in the test–retest procedure in the validation study (paper I). This was because of practical difficulties involved in administering the retest questionnaire. However, the main purpose was to include patients across a broad spectrum of symptom severity, which was achieved.

A concern in the planning of the method agreement study (paper IV) was the selection of the patients who should be included in the analysis of sickness absence *duration*. We decided to include those patients who had had absence according to either self-report or the NSBR. If all patients had been included, the difference between the two methods would not only result from the disagreement between the two methods but would also have reflected the varying numbers of patients without sickness absence in the three recall time periods. However, to ensure that the self-report of no absence was checked against the registry, we also analysed the *occurrence* of sickness absence.

To assess the prognostic factors for return to work, only sick-listed patients were included in the analysis (paper V). This gave us the opportunity to provide estimates for how fast patients returned to full-time work using Cox's regression. If patients who were working at baseline had been included, this analysis would not have been possible. Conversely, if working patients had been included, the impact of the baseline sickness absence on the probability of return to work at two years could have been assessed. Because two previous studies[129, 130] found no evidence that workers' compensation was significantly related to work status after two or four years, we considered that issue to be less important when we were designing the study reported in paper V.

The second study sample, the general population sample reported in paper III, was recruited 2–4 years before the patient cohort sample. This might have caused bias, but

previous research has demonstrated that SHC scoring in the general population is remarkably stable over time[92]. However, another potential source of bias concerns the different methods with which the SHC questionnaire was administered. In the patient sample, the patients described their SHCs in a self-reported questionnaire format, whereas in the general population, the SHC data were obtained by computer-assisted telephone interviewing. This might have affected the response rates. The response rates for random-digit-dialling sample surveys are not quantifiable because the sampling is continuous until the quota is reached. An Australian study indicated that 30%–55% of eligible persons responded to a survey of beliefs about back health in the general population when this methodology was used[131]. Random digit dialling has been shown to be feasible and accurate in other fields of health research[132]. However, no information exists about the non-responders in the present general population sample, i.e., those who did not have a telephone, those who did not answer the phone calls, and those who refused to participate. Therefore, we do not know whether the responders and non-responders differed in terms of their SHC scores.

9.1.3 Validity of sciatica-specific outcomes

In the first paper, the translation and cross-cultural adaptation of the sciatica-specific outcome measures—the SBI, the SFI, and the MSBQ—were performed according to recent guidelines[133], and their psychometric properties were tested according to the recommendations of Terwee et al.[134].

A major issue regarding the internal validity of the MSBQ was the relatively large number of patients (4.6%–5.0%) who missed one or more items. The sexual activity item alone was not completed by 2.8% of respondents. Missing item rates as high as 15% have been reported for the original Roland–Morris Disability Questionnaire[135]. In general, there is no agreement in the literature about how to deal with missing items in quality-of-life measures. Because our study was the first to use the MSBQ as a free-standing outcome measure, no procedure exists yet to handle missing items in the MSBQ. However, for quality-of-life instruments that are based on unweighted sum scores, it is common to substitute missing items with the arithmetic mean of those items that are available. This procedure is restricted to cases in which the respondent has completed at least half the items on the scale[136, 137]. However, in the current study, no data were imputed.

The main constructs in the sciatica-specific outcome measures were tested by forming *a priori* hypotheses regarding the relationships between the three measures of interest measured with established instruments, such as the SF-36[110], and pain visual analogue

scales[138]. Because there is no gold standard available for constructs like 'disability' and 'pain and symptoms', testing the construct validity in terms of prespecified hypotheses is the recommended method[134]. However, with respect to construct validity, our results indicated that the patients did not distinguish between symptom *bothersomeness* and symptom *frequency*. In most aspects of the validation process, the results of the SBI and SFI were very similar. The use of both questionnaires did not seem to yield more information than the use of one. This is consistent with previous research in which the results of both measures have been reported[43, 73, 139, 140].

The validation process also revealed an interesting point regarding the importance of the scoring formats of these scales. The SFI categories are labelled: *not at all*, *very rarely*, *a few times*, *about half the time*, *usually*, *almost always*, and *always*. The SBI categories have category labels: 0 (*not bothersome*), 3 (*somewhat bothersome*), and 6 (*extremely bothersome*). On the SFI, patients avoided the middle response category *about half the time*, whereas on the SBI, there was no corresponding avoidance of the middle response category. There are different opinions in the literature on the use of an odd number of categories for a symmetrical scale. The middle category usually represents a "don't know" alternative, and some argue that it is better to have an even number of categories so that the respondents must make a choice[136]. There are concerns about treating ordered categorical scales as if they are true interval scales, because one cannot know if the size of the difference, say between *not at all* and *very rarely*, is identical to the size of the difference between *usually* and *almost always*. This may represent a potential weakness of the SFI.

We also investigated the test–retest properties using several recommended methods[116, 134]. In general, the test–retest reliability was moderate to good, independent of the method used. To ensure an adequate sample size, we included 87 patients. No general rules for the appropriate sample sizes for test–retest studies exist, but $n > 50$ has been suggested[116, 134]. We also chose to use a test–retest interval of two days, assuming that this would be long enough for the patients to forget their earlier responses. Another method is to select patients who, after a period of follow-up, state that their condition has not changed and compare their score values at the first and second occasions. Atlas[44] used a time interval of three months when evaluating the MSBQ. With such a long recall interval, it is difficult to know how much error is caused by the measure and how much is recall error.

In this study, responsiveness was investigated with both a *distribution-based approach*, using statistical distributions, and an *anchor-based approach*[141], using an external criterion by which the change in the measure under study is compared. An example of a

distribution-based method is when the change is related to the minimal detectable change (paper I). When a change is larger than the minimal detectable change, one can assume, with 95% confidence that a real change has occurred. We used two anchor-based approaches, one retrospective and one prospective. The retrospective anchor was the patient's rating on a global change scale at the three-month follow-up. However, the method of using a retrospective external criterion, although very common in the literature, has been criticized. Norman[142] claimed that this implies that we accept that a single-item global rating is superior to the multi-item measure under study. If this is true, it would be reasonable to use the global change scale rather than the new measure. Furthermore, the correlated measurement error between the global rating and the new measure is likely to inflate the true association between them. It is also likely that patients have difficulty recalling their initial state on which the estimate of change is based. Therefore, we also created a prognostic anchor, which would be independent of the patient's ratings. Based on reports in the literature indicating greater short-term improvement after surgical treatment than after non-surgical treatment, a criterion was created according to whether or not the patients underwent surgery between baseline and three months.

Among a large number of available measures of responsiveness, we chose to calculate the standardized response mean and the area under the receiver operating characteristic curve[143, 144]. After the papers of the present study were published, an expert Delphi panel[145, 146] gave a consensus statement on the taxonomy, terminology, and definitions of measurement properties for health-related patient-reported outcomes (PRO). The methods used in our study are generally consistent with the recommendations of the experts. However, in assessing responsiveness, the Delphi panel considers the use of effect sizes inappropriate, including the standardized response mean. They argue that effect sizes represent measures of the magnitude of change attributable to an intervention or other event, rather than measures of the quality of the measurement instrument itself. The panel recommends using the same method to assess responsiveness as is used to assess construct validity by testing prespecified hypotheses about the relationships of the changes in the questionnaires to the changes in other measures.

We also determined the minimal important change, which has been defined as the smallest difference in an instrument's score that patients perceive as beneficial or which would mandate a change in the patient's management[147]. In the literature, the terms 'minimal clinically important difference' (MCID) and 'minimal clinically important change' (MCIC) are used interchangeably with the minimal important change. Because we did not expect many patients to become worse between baseline and three months, no minimal important

change addressing deterioration was defined. Therefore, in the present study, the most accurate meaning is the minimal important *improvement*.

9.1.4 Validity of the Subjective Health Complaints Inventory

In the literature, there is no consensus regarding the definition of the term 'comorbidity'. In the present study, we used Feinstein's definition as "coexisting ailments to an index disease"[148], but several others exist. A review identified 13 different methods to assess comorbidity[149], from counting the number of coexisting diseases or the ICD-9 codes[150], to counting those conditions that have required treatment or have altered organ function[151]. Comorbidity has been assessed with interviews, questionnaires, physical examination, medical chart reviews, and coded databases[149].

The main reason for using the Subjective Health Complaints Inventory in the present study was that when the study was planned, it was the only self-reported comorbidity instrument that had been used in a Norwegian population. Furthermore, in co-operation with one of the authors of paper III, Camilla Ihlebæk, we had access to a data set that allowed us to compare the sciatica cohort directly with a general population sample.

The Subjective Health Complaints Inventory has been used in various populations and settings[152-156]. A disadvantage of it is that its psychometric properties, such as its test–retest and construct validity, have not been properly assessed. According to the authors who developed the inventory, their objective was to create an instrument that was able "to score subjective health complaints as they occur in the normal working population, without diagnoses, hypotheses or attributions"[93]. The selection of items was "not based on any specific theory and should cover the most frequent health concerns and reasons for encounter with a general practitioner." The authors do not state whether the selection of symptoms was based on prevalence estimates of all the symptoms that occur in primary care, so we cannot know the percentage of the complaints presented to a general practitioner that are covered by the inventory. Nor was the reason for the inclusion of each item specified. Another symptom list in current use, the Personal Health Questionnaire-15, was constructed to cover 90% of physical complaints reported in an outpatient setting[157]. Recently, it has been shown that general practitioners categorize 21% of these physical symptoms as medically explained, 37% as medically unexplained and 41% as neither fully explained or non-explained[158].

Many of the SHC items represent medically unexplained somatic symptoms or functional somatic symptoms that are commonly used to screen for somatization[157]. Eleven of the 20 symptoms in the somatization disorder criteria list of the Diagnostic and Statistical

Manual of Mental Disorders IV are also found in the Subjective Health Complaints Inventory, whereas cold/flu, cough/bronchitis, asthma, eczema, and allergy are generally not regarded as medically unexplained somatic symptoms. A self-administered measure cannot distinguish between medically explained and unexplained symptoms, a distinction that requires a directed interview and clinical judgment. Therefore, in this study, we regarded the SHC scores to represent both medically explained and unexplained symptoms.

In the present study, the respondents were asked to grade the intensity of each SHC item experienced in the preceding month on a four-point scale: *not at all* (0), *a little* (1), *some* (2), and *severe* (3). To compare the occurrence of complaints in the sciatica patient sample and the population sample with logistic regression, the responses were categorized into *absent* (0) or *present* (1, 2, or 3). Dichotomizing complaints into present or absent may create bias because information regarding severity is lost. It can also be argued that complaints with *a little* intensity are clinically irrelevant, and a cut-off at *some* intensity would be more appropriate. However, previous clinical samples[159, 160] showed strong associations between the ORs for *any complaints* (score > 1) and *substantial complaints* (score > 2). In the reference population, the correlation coefficient between *any complaints* and *substantial complaints* was 0.81. Dichotomizing the scores into absent or present and summing the number of SHC items present made it possible to compare the patients' SHC scores with those of the general population sample, and between baseline and the one-year follow-up. However, because some of the SHC items overlap, summing the items from the Subjective Health Complaints Inventory may be methodologically disputable. For example, a person with gastric symptoms will report several possible complaints: 'stomach discomfort', 'heartburn', 'ulcer/non-ulcer dyspepsia', and 'stomach pain', resulting in an SHC score of 4, whereas a person bothered with hot flushes would only have a score of 1.

Compared with the general population sample, the adjusted ORs for the sciatica patients reporting any SHC were significantly elevated for 15 of the 27 SHC items. Statistically, we expected that 5% (i.e., 1–2 items) would be elevated by chance. Consequently, the high number of elevated ORs cannot be explained by the high number of analyses performed.

9.1.5 Validity of sickness absence

In the present study, the public registry (NSBR) was regarded as the reference standard. In assessing the agreement in the *duration* of sickness absence, we calculated the 95% limits of agreement and presented a chart in which the differences between the self-report and registry

data were plotted against the registry data. Bland[114] has recommended that in studies where the true value is unknown, the difference between the measurements produced for each subject with the two methods should be plotted against their mean. Because we used the registry data as the reference standard in the present study, we chose to plot the differences against the registry values. The 95% limits of agreement were calculated as described previously, handling the measurements made with each method as the test–retest measurements were handled in paper I.

No formal validation of the accuracy of the NSBR data has previously been performed. The NSBR data constitute the basis for the payment of sickness benefits and are generally regarded as accurate, but this does not imply that they are free of error. The lack of knowledge about how well the NSBR register data agree with the sickness certificates and the actual presence at work is a limitation of the present study.

A number of methodological challenges exist in the self-report of sickness absence. In Norway, an individual may be listed to participate in rehabilitation in the work-place, making it complicated for the individual to know whether he or she is formally sick-listed or working. The same may apply to periods of parental leave and vacation[16]. Patients may also have more than one place of employment and only be sick-listed for one of them, or retired pensioners may have a part-time job. For practical reasons, the respondents in this study were classified as having had sickness absence if they were registered by the NSBR, regardless of whether their sick leave was partial or complete. We did not have access to NSBR data regarding the percentage of partial sickness absence. Therefore, our analyses were performed without differentiating between those with low and those with high sickness absence percentages, assuming that the degree of sickness absence would not influence the validity of the self-report. This assumption does not necessarily hold true; an individual who is on complete sick leave and staying at home may be more aware of his or her sickness absence status than someone who is on partial sick leave and working six in eight hours every day.

Another potential source of error lies in the validity of the diagnoses on the sickness absence certificates. In planning the study, we decided only to ask the patients for permission to obtain registry data regarding their back pain/sciatica. Therefore, only absences with the diagnostic code for back pain or sciatica were available for analysis. Because the diagnoses on sickness certificates are generally written for administrative purposes, little is known of how well they reflect the actual clinical conditions of the patients[161].

9.1.6 The prognostic analyses

In paper V, we used the definition of removal from the NSBR sick list as a proxy for patients having returned to full-time work. Removal from the list implies receiving no financial support from the NSBR. No documentation of this assumption exists, but in our opinion, it is a very creditable assumption. In Norway, individuals who have received short-term benefits will also be entitled to long-term benefits if their disease persists, so removal from the list indicates a return to work. The NSBR sick list does not include people on retirement pensions, so anyone who reported being an *old-age pensioner* at the two-year follow-up was excluded from the analyses. Those who reported being a *student* or *homemaker* were also excluded.

The selection of potential prognostic factors in paper V was based on a broad perspective, by including variables reflecting demographic, psychological, and social factors, in addition to clinical examination findings. A limitation of the present study was that work-related variables were not included. Previous research has indicated that several work-related variables, including job demands, control, strain, and flexibility, are important factors in returning to work[14, 15, 81].

Multivariate logistic regression and Cox's proportional hazard regression analyses are generally considered the most suitable methods for investigating the potential prognostic factors for an outcome[15]. Various authors have suggested that in multiple logistic regression and proportional hazard analyses, at least 10 events are required for each independent variable[112, 118]. However, Vittinghoff[162] showed that 5–9 events may be acceptable. In paper V, Cox's regression was performed with eight events per variable and logistic regression with nine events per variable.

9.2 Main results compared with other published studies

9.2.1 Symptom self-report

The self-report of symptoms assessed with the Norwegian versions of the SBI and SFI and the self-report of disability assessed with the Norwegian version of the MSBQ were found to be acceptable for patients with sciatica, and overall, the psychometric properties were good. Several sciatica studies have been performed with non-specific back-pain-related disability measures, including the original Roland–Morris Disability Questionnaire or the Oswestry Disability Index as the primary outcome measures[59, 140]. A potential limitation of our study was that the sciatica-specific measures were not compared with these commonly used back-specific measures. Therefore, we cannot say whether there are any advantages in using sciatica-specific measures compared with standard back-pain outcome measures. A key issue

here is how the different measures handle radicular symptoms compared with back pain. For instance, the Oswestry Disability Index does not distinguish between back and radicular symptoms but simply examines perceived function. The sciatica indices partly incorporate back pain in one of the four items by asking about back or leg pain while sitting. Because sitting entails stretching the L5 and S1 nerve roots, that item is probably intended to measure radiculopathy. However, back pain is important in sciatica. At baseline, the patients' mean score on the back pain visual analogue scale was 43, whereas the mean leg pain score was 63. Further studies must be undertaken to assess whether the weighting of back pain in the sciatica indices is appropriate.

To our knowledge, the present study is the first to investigate self-reported paraesthesia and weakness in patients with sciatica, and consequently our results in paper II are difficult to compare with the existing literature. Based on previous research, it is not surprising that women rated the severity of their leg pain higher than men[163, 164]. Our results also demonstrate a sex difference in the self-report of paraesthesia and weakness. The clinical examination findings were weakly associated with symptom severity; for instance, muscular paresis explained only 19% of the variability in self-reported weakness, and sensory findings only 10% of the variability in paraesthesia. The associations between the symptoms and the clinical test results warrant further exploration.

9.2.2 Comorbidity

Our results in paper III show that patients with sciatica reported a higher mean SHC score than the general population. Except for a Finnish population study[54] that showed weak associations between sciatica and cardio-vascular, respiratory, mental, and some musculoskeletal conditions, we are not aware of other comorbidity studies of sciatica. Consequently, it is difficult to relate our findings to the existing literature. The high occurrence of anxiety and depression are consistent with previous research showing strong associations between pain and emotional distress[165-168] and between depression and physical illness in general[169, 170].

The mean score for SHCs reported by the sciatica patients at baseline (7.5 [SD 4.5]) closely resembles the mean score recently reported by patients with chronic non-specific low back pain (7.6 [4.5])[171] when the same methodology was used. In another Norwegian study of low back pain[159], patients who had been sick-listed for 8–12 weeks reported seven of the 27 SHCs more frequently than a reference population, as compared with 17 in the sciatica

cohort at baseline. These two studies suggest that there are no important differences between specific and non-specific back pain in terms of comorbid SHCs.

The very high odds for reporting SHCs among those who at the 1 year follow-up had *unchanged or worse* sciatica are comparable to those reported by patients with chronic whiplash-associated disorders[153] or irritable bowel syndrome[160]. This suggests that a high prevalence of comorbidity is not confined to conditions regarded as unexplained or functional. The reduction in the SHC scores to normal levels in those who recovered fully from their sciatica might imply that comorbidity in this patient group is a phenomenon secondary to pain and disability. Interestingly, the SHC scores at the time of inclusion in the cohort varied according to how the patients reported the outcome of their sciatica *one year later*. Those who stated that they had recovered at the one-year follow-up reported lower SHC scores at baseline than those of patients who stated that they were a little better, unchanged, or worse at the one-year follow-up. These results are consistent with the prospective analysis of the current cohort by Haugen et al. (submitted), who found that higher SHC scores at baseline significantly increased the probability of an unsuccessful *clinical* outcome at one and two years. However, the multivariate analysis reported in paper V showed that increasing SHC scores did not predict the return to work or the duration of sickness absence. Unfortunately, no other longitudinal studies of this subject exist.

SHC items such as cold/flu, cough/bronchitis, asthma, and eczema did not seem to be affected by sciatica. These items were not more prevalent in the total cohort at baseline, or their ORs elevated in the *unchanged* or *worse* group at the one-year follow-up, compared with the general population sample. This is consistent with Hagen's findings in patients with low back pain[159].

More prospective studies are required to increase our knowledge of the mechanism involved and how health complaints are formed and evolve. Such studies should especially focus on the early stages of pain.

9.2.3 Sickness absence according to self-report data and registry data

The main finding reported in paper IV was that the precision of the self-reported *duration* of sickness absence was poor, whereas the self-reported *occurrence* of sickness absence was acceptable. Several investigators have reported results based on the self-report of sickness absence without discussing the validity of their data[80, 172, 173]. As might be expected, the agreement between the self-reported and registry data was better for the *occurrence* of

sickness absence than for the *duration,* but dichotomized occurrence data are obviously less useful.

Our results commend caution in using self-reported duration of sickness absence in research. However, our results must be replicated before they can be generalized to other settings or samples. Because the definitions, procedures, and legislative rules of sickness absence vary between countries, the validity of the self-report of sickness absence may need to be established in each country of interest.

9.2.4 Prognostic factors for sickness absence and return to work

At the two-year follow-up, approximately 75% of the patients who were sick-listed or on rehabilitation at baseline had returned to full-time work, which is consistent with previous research[74]. Previous studies of the prognostic factors for return to work in sciatica patients have focused on the effect of the baseline compensation status of the patients, without finding this factor to be significantly related to the outcomes at two or four years of follow-up[74, 129]. At the four-year follow-up in the Maine Lumbar Spine Study, younger age, better self-perception of general health, and less severe low back pain at baseline were associated with higher return to work rates[74]. Although our results are restricted to a two-year follow-up period, they confirm those findings and add further potential prognostic factors: A negative straight leg raising test, lower bothersomeness of sciatica at baseline, less fear avoidance–work, a shorter history of sciatica, and a duration of the current episode of < 3 months predicted a faster return to work or a higher return to work rate.

The finding that surgical therapy was significantly associated with a slower return to work was surprising, although the lack of a positive association between surgery and return to work has also been reported by others. In a randomized controlled trial that compared early surgery with prolonged conservative care, van den Hout[174] reported increased absenteeism from work immediately after surgery but no significant differences in sickness absence between the groups from baseline to one year. In both the observational and randomized SPORT trials[72, 73], surgery was not significantly related to self-reported return to work at two years and the same was found at the four-year follow-up in the Maine Study[74]. The mechanism underlying why surgery leads to a slower return to work is difficult to explain, especially because surgery has been associated with a more rapid recovery from sciatica[72, 73, 113]. The prospective analysis of the current cohort by Haugen et al. showed that surgical treatment was significantly associated with self-reported recovery after one year, but not at the two-year follow-up (Haugen et al., submitted).

The present study also found that the straight leg raising test, the SBI, and back pain remained significantly associated with return to work in the final multivariate models. These results are similar to the results of Schade et al.[76] who found that preoperative pain levels in surgical patients predicted self-reported return to work two years after the operation. The results of a Finnish study of surgical patients[80] also indicated that the leg pain and pain-related disability reported after the operation were related to the number of self-reported sickness absences. Consistent with the Maine Lumbar Spine study[74], findings of abnormal motor or sensory functions were not associated with return to work in.the present study.

Our study is the first to report the role of fear avoidance beliefs in sciatica, suggesting a negative association with return to work. A systematic review[175] of studies of low back pain provided no evidence of fear avoidance as a strong risk factor for poor outcomes, including occupational disability. However, previous authors have usually not distinguished between fear avoidance for work and fear of movement. In the present study, fear of movement/re-injury was not significantly associated with return to work in the multivariate analysis. It is possible that fear avoidance–work functions as a proxy for work-place-related factors. In a study of workers with musculoskeletal disorders, Løtters[176] reported that the prognostic value of fear avoidance on compensation benefits was no longer significant when work-related variables were included in the multivariate model.

Other potential prognostic factors such as level of education, smoking, self reported comorbidity and emotional distress were not significantly associated with return to work in our final multivariate models. There is a well known association beteween educational attainment and general health[177, 178], but education has not been consistently associated with return to work in low back pain[14, 15]or other health conditions[179, 180]. However, a few studies on surgically treated sciatica patients indicated lower education levels to be associated with less return to work[78]. Moreover, although higher levels of self-reported comorbidity was significantly associated with a non-successful clinical outcome in the study of Haugen et al (submitted), it was not significantly associated with return to work. Since the literature on the prognostic ability of self reported comorbidity on work related outcomes is sparse, it is difficult to compare our findings with other current relevant evidence. Similarly, emotional distress did not remain in the multivariate models. This finding is opposite to two previous studies on surgical treated sciatica patients, which found that depression was associated with work capacity at 1 year[79]and with return to work at 2 years[76].

Because of the differences in definitions, procedures, and legislative rules relating to sickness absence across countries, comparisons with other studies should be done with

caution. Most of the findings in the present study must also be replicated by others before they can have direct implications for clinical practice.

10 CLINICAL IMPLICATIONS AND FURTHER RESEARCH

Validated questionnaires are not yet commonly used in daily clinical work among patients with sciatica. The present study has provided Norwegian versions of sciatica-specific measures of symptoms and disability, which are now ready for use. The effects of introducing these measures into the clinical context should be investigated, especially to determine whether their use leads to changes in patient care.

Another issue is the validity of self-reported weakness in sciatica. In the present study, a clinical finding of muscular paresis, scored as present or absent, only explained one-fifth of the variability in self-reported weakness. The agreement between self-report and a clinical examination requires further scrutiny. This should be done by relating self-report to a more detailed and graded clinical scoring procedure than was used in this study.

Among the studies of comorbidity in back pain, the present study is the first to use a prospective rather than a cross-sectional design. To extend our knowledge of the mechanism involved and how health complaints are formed and evolve, more prospective studies are required. Such studies should especially focus on the early stages of pain.

More research is also required on the topic of using self-reported sickness absence duration data in research rather than registry data. Because of differences in the definitions, procedures, and legislative rules relating to sickness absence across countries, the results should be compared with caution.

Caution must also be exercised in implementing the prognostic factors for occupational disability until our findings have been replicated in other studies. The prognostic capacity of work-related characteristics should be investigated, especially if such factors modify the effects of fear avoidance beliefs regarding work. The next step in this research will be to test whether interventions targeted at prognostic factors can prevent prolonged sickness absence or delayed return to work in patients with sciatica.

11 CONCLUSIONS

- The Norwegian versions of the Maine–Seattle Back Questionnaire, the Sciatica Frequency Index, and the Sciatic Bothersomeness Index were rapidly administered, with acceptable internal consistency, test–retest reliability, measurement error, construct validity, and responsiveness.
- The patients rated leg pain as their most bothersome symptom, followed by paraesthesia and weakness. Men reported lower symptom scores than women.
- Patients with sciatica caused by lumbar disc herniation reported significantly more health complaints than the normal population. At the one-year follow-up, the number of complaints decreased to normal levels among those who had fully recovered. In patients with persistent or worsened sciatica, the number of health complaints increased to almost double that in the general population.
- The agreement between self-reported data and data from a public registry regarding the duration of sickness absence was poor for a recall period of three months, and became worse as the length of the recall period increased. The use of self-reported data on the duration of sickness absence may severely reduce the statistical power of clinical trials and the accuracy of cost estimates for sickness absence in sciatica patients. The agreement on the occurrence of sickness absence was generally good.
- Twenty-five per cent of patients who were sick-listed at baseline were still away from work at the two-year follow-up. The baseline factors positively associated with return to work were younger age, better self-perceived general health, less bothersomeness of sciatica, fewer fear avoidance beliefs regarding work, less back pain, fewer previous sciatica episodes, a shorter duration of the current episode, and a negative straight leg raising test. Surgical treatment was associated with a slower return to work.

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13 APPENDIX

The Norwegian version of the Maine Seatlle back questionnaire

Når du har vondt i ryggen eller benet (isjias) kan det være vanskelig å gjøre noen av de tingene du vanligvis gjør. Her er noen setninger folk har brukt for å beskrive seg selv når de har ryggsmerter eller isjias. Når du leser dem kan det være at noen av dem skiller seg ut fordi de beskriver deg i dag. Når du leser en setning som beskriver deg i dag, sett ett kryss for ja i boksen til høyre, hvis ikke setningen passer så kryss av i nei-boksen.

Jeg skifter stilling ofte for å forsøke å gjøre det behagelig for ryggen eller benet (isjias)……..	□ Ja	□ Nei
På grunn av ryggen eller benet (isjias) bruker jeg gelenderet for å gå opp trapper……...	□ Ja	□ Nei
På grunn av ryggen eller benet (isjias) kler jeg på meg saktere enn vanlig…….	□ Ja	□ Nei
På grunn av ryggen eller benet (isjias) står jeg oppreist bare i korte stunder av gangen……..	□ Ja	□ Nei
På grunn av ryggen eller benet (isjias) forsøker jeg å la være å bøye meg eller sette meg på kne……	□ Ja	□ Nei
På grunn av ryggen eller benet (isjias) synes jeg det er vanskelig å reise meg fra en stol……..	□ Ja	□ Nei
Jeg har vondt i ryggen eller benet nesten hele tiden…….	□ Ja	□ Nei
På grunn av ryggen eller benet (isjias) sover jeg dårligere……...	□ Ja	□ Nei
På grunn av ryggen eller benet (isjias) holder jeg for det meste sengen..	□ Ja	□ Nei
På grunn av ryggen eller benet (isjias) har min seksuelle aktivitet avtatt	□ Ja	□ Nei
Jeg pleier å gni eller holde på de stedene på kroppen som gjør vondt eller er ubehagelige……...	□ Ja	□ Nei
På grunn av ryggen eller benet (isjias) gjør jeg mindre av det daglige arbeidet i huset enn jeg vanligvis ville gjort…….	□ Ja	□ Nei

The Norwegian versions of the Sciatica Bothersomeness Index (A) and the Sciatica FrequencyIndex (B)

(A) I løpet av DEN SISTE UKEN, hvor ofte har du hatt hvert av de følgende symptomene.
Sett ett kryss for hvert spørsmål i den ruten du synes passer best.

Symptomer		Ikke i det hele tatt	Svært sjelden	Noen ganger	Omtrent halve tiden	Ofte	Nesten hele tiden	Hele tiden
1.	Smerter i korsryggen							
2.	Smerter i benet (isjias)							
3.	Nummenhet eller prikking i benet, foten eller lysken							
4.	Nedsatt kraft i benet eller foten (f.eks. vansker med å løfte foten)							
5.	Smerter i ryggen eller benet når du sitter							

(B) DEN SISTE UKEN, hvor plagsomme har symptomene vært?
For hvert spørsmål, sett en ring rundt tallet som passer best

	Symptomer	Ikke plagsomme			Noe plagsomme			Ekstremt plagsomme
1.	Smerter i korsryggen	0	1	2	3	4	5	6
2.	Smerter i benet (isjias)	0	1	2	3	4	5	6
3.	Nummenhet eller prikking i benet, foten eller lysken	0	1	2	3	4	5	6
4.	Nedsatt kraft i benet eller foten (f.eks. vansker med å løfte foten)	0	1	2	3	4	5	6
5.	Smerter i ryggen eller benet når du sitter	0	1	2	3	4	5	6

The Subjective Health Complaints Inventory

Helseproblemer siste 30 døgn

Nedenfor nevnes noen alminnelige helseproblemer Vi vil be deg om å vurdere hvert enkelt problem/symptom, og oppgi **i hvilken grad du har vært plaget** av dette i løpet av de siste tretti døgn. (Sett ring rundt tallet som passer)

		Ikke plaget	**Litt plaget**	**Endel plaget**	**Alvorlig plaget**
1.	Forkjølelse, influensa.....	0	1	2	3
2.	Hoste, bronkitt	0	1	2	3
3.	Astma	0	1	2	3
4.	Hodepine	0	1	2	3
5.	Nakkesmerter.....	0	1	2	3
6.	Smerter øverst i ryggen	0	1	2	3
7.	Smerter i korsrygg	0	1	2	3
8.	Smerter i armer	0	1	2	3
9.	Smerter i skuldre.....	0	1	2	3
10.	Migrene	0	1	2	3
11.	Hjertebank, ekstraslag	0	1	2	3
12.	Brystsmerter	0	1	2	3
13.	Pustevansker	0	1	2	3
14.	Smerter i føttene ved anstrengelser	0	1	2	3
15.	Sure oppstøt, «halsbrann»	0	1	2	3
16.	Sug eller svie i magen	0	1	2	3
17.	Magekatarr, magesår.....	0	1	2	3
18.	Mageknip.....	0	1	2	3
19.	«Luftplager»	0	1	2	3
20.	Løs avføring, diaré	0	1	2	3
21.	Forstoppelse.....	0	1	2	3
22.	Eksem.....	0	1	2	3
23.	Allergi	0	1	2	3
24.	Hetetokter	0	1	2	3
25.	Søvnproblemer.....	0	1	2	3
26.	Tretthet	0	1	2	3
27.	Svimmelhet.....	0	1	2	3
28.	Angst	0	1	2	3
29.	Nedtrykt, depresjon.....	0	1	2	3

I

II

III

IV