



Observational Study

Patient-reported improvements of pain, disability, and health-related quality of life following chiropractic care for back pain – A national observational study in Sweden

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ABSTRACT

Background: Chiropractic care is a common but not often investigated treatment option for back pain in Sweden. The aim of this study was to explore patient-reported outcomes (PRO) for patients with back pain seeking chiropractic care in Sweden.

Methods: Prospective observational study. Patients 18 years and older, with non-specific back pain of any duration, seeking care at 23 chiropractic clinics throughout Sweden were invited to answer PRO questionnaires at baseline with the main follow-up after four weeks targeting the following outcomes: Numerical Rating Scale for back pain intensity (NRS), Oswestry Disability Index for back pain disability (ODI), health-related quality of life (EQ-5D index) and a visual analogue scale for self-rated health (EQ VAS).

Results: 246 back pain patients answered baseline questionnaires and 138 (56%) completed follow-up after four weeks. Statistically significant improvements over the four weeks were reported for all PRO by acute back pain patients ($n = 81$), mean change scores: NRS -2.98 ($p < 0.001$), ODI -13.58 ($p < 0.001$), EQ VAS 9.63 ($p < 0.001$), EQ-5D index 0.22 ($p < 0.001$); and for three out of four PRO for patients with chronic back pain ($n = 57$), mean change scores: NRS -0.90 ($p = 0.002$), ODI -2.88 ($p = 0.010$), EQ VAS 3.77 ($p = 0.164$), EQ-5D index 0.04 ($p = 0.022$).

Conclusions: Patients with acute and chronic back pain reported statistically significant improvements in PRO four weeks after initiated chiropractic care. Albeit the observational study design limits causal inference, the relatively rapid improvements of PRO scores warrant further clinical investigations.

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1. Background

Back pain is a common disorder that affects both physical health and mental wellbeing (Statens beredning för medicinsk utvärdering, 2000). In addition to the individual suffering back

pain also has significant impact on societal costs (Lidwall, 2011; Statens beredning för medicinsk utvärdering, 2000). Back pain is a complex condition that may be caused by a variety of biological, psychological and social factors (Statens beredning för medicinsk utvärdering, 2010; van Tulder et al., 2006). It has been estimated that the vast majority of back pain cases is of non-specific origin (Airaksinen et al., 2006; van Tulder et al., 2006), which can make it especially difficult to manage efficiently. Chiropractic treatment such as spinal manipulation is recommended in clinical guidelines of back pain management (Globe et al., 2016; Lidwall, 2011; van

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Tulder et al., 2006), especially so in the care of non-specific back pain. Recent research also reports emerging evidence that chiropractic care is a safe treatment for low back pain with clinically effects similar to physical therapy, and likely similar to exercise and medical care, albeit the cost-effectiveness of chiropractic care for low back pain is still uncertain (Blanchette et al., 2016), as is the impact on well-being outcomes that are often associated with chiropractic care (Parkinson et al., 2013). Notably, patient-reported outcomes (PRO), i.e. outcomes that details different aspects of patients' health status by means of patient report, e.g. health-related quality of life (HRQoL), has been suggested as an important area of research to increase the understanding and improvement of clinical care (Deshpande et al., 2011).

Chiropractors in Sweden become qualified to practice after five years of training at the Scandinavian College of Chiropractic in Sweden or at an equivalent educational institution abroad. All Swedish chiropractors need to be registered by the National Board of Health and Welfare. In Sweden, chiropractic is a registered health care profession alongside physiotherapy, medicine and other health professions, and chiropractors have to follow the healthcare regulations set by the Swedish healthcare authorities. Any misconduct in chiropractic practice has to be reported to the Health and Social Care Inspectorate. The majority of Swedish chiropractors work in private practice outside of conventional medical settings such as general practitioners offices or hospitals. Nonetheless, Swedish county councils recommend chiropractic care alongside other manual therapy interventions and physiotherapy for patients with back pain and other musculoskeletal disorders (Vårdguiden, 2017). However, despite the increased acceptance of chiropractic care in Sweden there is a scarcity of studies investigating chiropractic practice in Sweden. The aim of the present study was to explore PRO targeting back pain, back disability and health-related quality of life (HRQoL) for patients with low back pain seeking chiropractic care in Sweden.

2. Methods

2.1. Design, setting, and participants

The present investigation was a prospective national observational study involving 23 chiropractic clinics throughout Sweden within the chiropractic association Kiropraktiska Föreningen i Sverige (KFS). Adult patients (≥ 18 years) seeking care for non-specific low back pain of any duration at the participating chiropractic clinics, and able to answer a questionnaire in Swedish, were invited by the treating chiropractor to participate in the study. Exclusion criteria were on-going chiropractic care or severe causes of back pain such as tumours, infections or fractures. At baseline, patients' back pain duration was categorised into "acute" (six weeks or less) in line with European guidelines for how to define acute back pain (van Tulder et al., 2006), or longer, i.e. "chronic" (more than 6 weeks). The diagnosis and chiropractic treatment was determined by the treating chiropractor using standard clinical procedures, not a pre-defined treatment protocol, thus reflecting usual chiropractic care. The KFS chiropractic association reports that chiropractic care typically involves high-velocity low amplitude thrust techniques, and sometimes soft-tissue treatment, that are often complemented by home exercises (Kiropraktiska Föreningen i Sverige, 2017).

2.2. Sample size

For reasons of feasibility, the sample size was limited to the number of patients seeking care at the participating chiropractic clinics during the length of the study. A convenience sample of at

least 10 back pain patients by each participating chiropractic clinic was deemed feasible, i.e. this was the lowest number of new patients a participating chiropractic clinic was expected to see during the study period. This was predicted to give a total convenience sample size of 230 patients with returned questionnaires at baseline. The use of convenience sampling has been considered appropriate when conducting new studies (Machin and Campbell, 2005).

2.3. Data collection

Data were collected by paper-and-pencil questionnaires that had been pilot tested prior to data collection (Boynton, 2004). The chiropractors at the participating clinics were informed and instructed by the authors (FG and VD) about the details of the study and the standardized data collection procedures. Patients filled out the baseline questionnaire at the first visit to the chiropractic clinic, which was after the chiropractic examination but before the chiropractic treatment was initiated. The patient was instructed to put the completed questionnaire in an opaque sealed envelope, without showing the answers to the study chiropractor, after which the envelope was distributed to the external study administrators at the Scandinavian College of Chiropractic, who also administrated the follow-up questionnaires by post. Patients with acute back pain received follow-up questionnaires after two and four weeks, whereas chronic back pain patients received one follow-up questionnaire after four weeks. The follow-up after four weeks was the main measurement for all patients, whereas the two-week follow-up was included to detect potential short-term effects among patients with acute back pain. The follow-up periods were based on the natural history of pain (Lidwall, 2011; van Tulder et al., 2006). Data were collected between October 2012 and January 2013.

2.4. Patient-reported outcome measures

The questionnaire contained PRO that are well established in clinical care and research (van Tulder et al., 2006), including back pain specific instruments and generic instruments measuring HRQoL (Kane and Radosevich, 2010; Rabin and de Charro, 2001).

The Numerical Rating Scale (NRS) for back pain intensity consists of an eleven-grade scale ranging from 0 (no pain) to 10 (worst imaginable pain) (Williamson and Hoggart, 2005). The NRS is often used in clinical trials (Pool et al., 2007) and in clinical practice (Statens beredning för medicinsk utvärdering, 2010), it is easy to administrate and has a high responsiveness (Chapman et al., 2011). A pain reduction of 2.0 points on the NRS was considered as minimal clinically important difference (MCID) in the current study to distinguish a clinically relevant treatment effect (Farrar et al., 2001).

The Oswestry Disability Index (ODI), which is used by the Swedish spine registry (Svensk Ryggkirurgisk Förening, 2017), was used to measure back disability. ODI consists of ten questions with six answer alternatives for each question, which are used to calculate an index score between 0 and 100, where a higher value indicates more severe disability (Fairbank and Pynsent, 2000). The ODI has high reliability, validity, and responsiveness and is easy to administrate (Vianin, 2008), it has high validity in populations with high disability (Rabin and de Charro, 2001) and is sensible to detect clinical changes following treatment for patients with sub-acute and chronic back pain (Monticone et al., 2012). ODI in the general population is estimated to be 10; ODI among patients with back pain is estimated to be 27 (Rabin and de Charro, 2001). A reduction of 10.5 points on the ODI scale was used as the MCID value in the present study (Davidson and Keating, 2002).

The EQ-5D-3L is a short generic instrument measuring HRQoL and valid in patients with pain (Parkinson et al., 2013; Rabin and de

Charro, 2001; Solberg et al., 2005). EQ-5D-3L consists of five dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) with three severity levels (no problems, moderate problems, severe problems) (Rabin and de Charro, 2001). Patients also rate their overall health on a visual analogue scale (EQ VAS) ranging from 0 (worst imaginable health state) to 100 (best imaginable health state) (Rabin and de Charro, 2001). The UK MVH1 value set was used to derive a value, EQ-5D_{index}, for each of the 243 health states (Dolan, 1997), that can be used in health economic evaluations (Drummond et al., 2005). The EQ-5D_{index} is capable of detecting MCID among patients with pain (Whynes et al., 2013; Vianin, 2008), whereas MCID for EQ VAS is less well documented. An MCID of 0.07 for EQ-5D_{index} of patients with pain conditions was used in the present study (Jansson et al., 2009).

2.5. Data analysis

The dependent variables were NRS, ODI, EQ-5D_{index}, and EQ VAS. The main analysis of PRO were from baseline to four weeks, with additional analyses of acute back pain patients at the two-week follow-up. Data on patient characteristics were sex, age (categorised into age groups: 18–44 years; 45–64 years; and 65 years and above), occupational status (categorised into manual workers and non-manual workers), sick leave before first visit (yes, no), co-morbidity at baseline (yes, no), and treatment by other practitioner (yes, no). Assumptions for performing parametric tests were made on the whole study population, patient-groups, and subgroups. Assessing significant differences between patient characteristics were performed using the chi-squared test. Wilcoxon signed-rank test was used to test the change in EQ-5D_{index} from baseline to follow-up as it did not fulfill the assumption of normal distribution, whereas Student's paired sample *t*-test was used for NRS, ODI and EQ VAS from baseline to follow-up. For acute back pain patients, a rANOVA was used to test the change in NRS from baseline to both two and four weeks within all subgroups and post-hoc testing (Tukey's) for multiple comparisons of means was performed. Only available responder data was analyzed, e.g. imputation procedures of missing data due to no response at follow-up was not made. Data were entered and analyzed in SPSS and statistical significance was set to 5% (IBM Corp, 2012).

2.6. Ethical considerations

Patients received oral and written study information and an invitation to participate in the study by the treating clinician upon arrival. Study participation was voluntary and there was no financial reward to participate. Written informed consent was obtained before enrolment and patients were free to discontinue their participation for any reason at any time without any implications for their current or future care. The study was approved by the Regional Ethical Review Board in Stockholm, Sweden (Dnr 2012/2142–31/2).

3. Results

A total of 246 back pain patients enrolled in the study of which 61% (*n* = 149) had acute back pain (Fig. 1). A total of 138 patients remained in the study and answered the final questionnaires after four weeks, an overall response rate of 56% (Fig. 1). Patients with chronic back pain had a response rate of 59% (57/97) and acute back pain patients of 54% (81/149), respectively (Fig. 1).

3.1. Patient characteristics

The patients' characteristics are presented in Table 1. There were

more women with chronic back pain and more men with acute back pain that sought chiropractic care, whereas age, type of occupation and treatment by other practitioner were similar between the acute and chronic back pain groups (Table 1). Sick leave at baseline and co-morbidity was more common among patients with acute back pain. Patients with chronic back pain reported more treatments by chiropractors after four weeks (Table 1).

There were more young patients and manual workers among the patients that withdrew from the study, but they did not differ in other characteristics.

3.2. Patient-reported outcomes

Table 2 shows the mean values for all PRO at baseline and at four weeks as well as the change after four weeks for patients with back pain of acute or chronic duration.

There were no statistically significant differences in PRO between the acute and chronic back pain groups at baseline: NRS (*p* = 0.48), ODI (*p* = 0.15), EQ-5D_{index} (*p* = 0.09), EQ VAS (*p* = 0.28). Patients with acute back pain reported a mean NRS decrease of 2.98, while ODI decreased 13.58, EQ-5D_{index} increased 0.22, and EQ VAS increased 9.63 after four weeks (Table 2). The decrease in NRS, ODI, and EQ-5D_{index} were all of MCID. In contrast, patients with chronic back pain reported a notably smaller NRS decrease from baseline to four weeks and, similarly, the EQ-5D_{index} and ODI scores changed marginally, whereby none of the observed changes were of MCID (Table 2).

3.3. EQ-5D dimensions

Table 3 describes the distribution of patients reporting a problem on the EQ-5D dimensions, i.e. the EQ-5D descriptive system at baseline and after four weeks for patients with acute or chronic back pain. Pain/discomfort was the dimension where most back pain patients reported moderate or severe problems at baseline, of which those reporting severe problems mainly had acute back pain (Table 3). Subsequently, after four weeks the acute back pain patients described large improvements in the reporting of no problems with pain/discomfort, and in the reporting of no problems in the usual activities and mobility dimensions (Table 3).

3.4. Back pain intensity of patients with acute back pain by subgroup characteristics

Table 4 shows the reported back pain intensity of patients with acute back pain at baseline, two weeks, and four weeks by age, sex, occupation, co-morbidity, sick leave, and treatment by other practitioner. In all subgroups there was a within subject effect over time. In each patient characteristic where a statistically significant change from baseline to two weeks was detected, a MCID decrease in NRS was also detected that was maintained after four weeks, except in the group that were treated by other practitioners (Table 4).

4. Discussion

This study explored PRO, i.e. back pain intensity, back disability, health-related quality of life and self-rated health, among patients with back pain receiving chiropractic care in Sweden. Patients with acute back pain reported statistically significant improvements between baseline and the main follow-up after four weeks for all PRO. Patients with chronic back pain also reported statistically significant, albeit somewhat smaller, improvements after four weeks for all PRO, except for self-rated health.

The rapid improvement of back pain intensity after two weeks

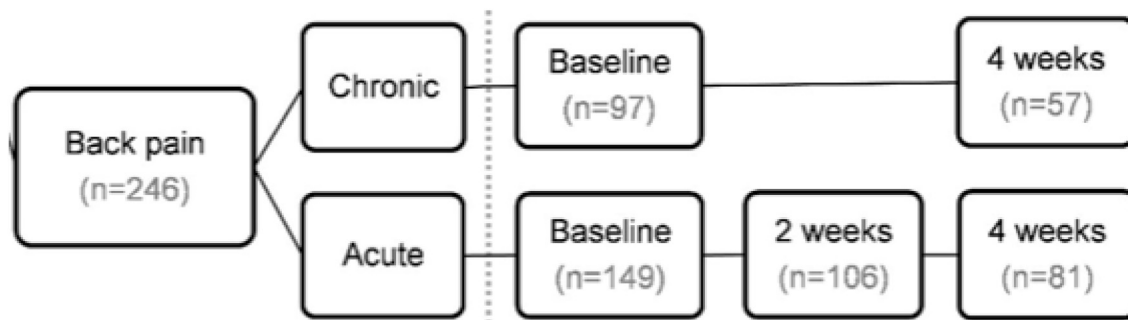


Fig. 1. Flow-chart of the back pain patients and the responses at baseline, two weeks and four weeks follow-up.

Table 1

Characteristics of enrolled back pain patients answering the follow-up at four weeks.

	Acute (n = 81)		Chronic (n = 57)		P-Value
	n	%	n	%	
Age					0.423
18–44 years	28	(34.6)	26	(46.6)	
45–64 years	39	(48.1)	23	(40.4)	
65 years and above	14	(17.3)	8	(14.0)	
Sex					0.006
Women	32	(39.5)	36	(63.2)	
Men	49	(60.5)	21	(36.8)	
Occupation ^a					0.409
Manual workers	27	(34.2)	14	(25.0)	
Non-manual workers	37	(46.8)	27	(48.2)	
Other ^b	15	(19.0)	15	(26.8)	
Co-morbidity					0.049
Yes	28	(34.6)	11	(19.3)	
No	53	(65.4)	46	(80.7)	
Sick leave at baseline					0.005
Yes	16	(19.8)	2	(3.5)	
No	65	(80.2)	55	(96.5)	
Treatment by other practitioner					0.711
Yes	15	(18.5)	12	(21.1)	
No	66	(81.5)	45	(78.9)	
	Mean	SD	Mean	SD	
Age	49.3	(12.9)	46.3	(14.7)	0.229
Number of treatments by chiropractor	1.7	(0.9)	2.5	(1.6)	0.000
Number of visits to other practitioner ^c	2.1	(1.3)	3.3	(2.8)	0.019

SD: Standard deviation.

^a Three missing values.

^b Students, unemployed, or retired.

^c Mean number of visits among the patients who reported treatment by other practitioner.

Table 2

Patient-reported outcome measures at baseline and at four weeks.

	N	Baseline	4 weeks	Change over 4 weeks	
		Mean (SD)	Mean (SD)	Mean (SD)	P-value
Acute back pain (n = 81)					
NRS	79	4.81 (2.05)	1.83 (1.72)	−2.98 (2.67)	<0.001
ODI	79	23.96 (14.97)	10.38 (10.96)	−13.58 (17.07)	<0.001
EQ VAS	79	68.47 (17.40)	78.10 (20.62)	9.63 (21.55)	<0.001
EQ-5D _{index}	79	0.65 (0.26)	0.86 (0.14)	0.22 (0.28)	<0.001
Chronic back pain (n = 57)					
NRS	56	4.59 (2.44)	3.69 (2.24)	−0.90 (2.06)	0.002
ODI	52	19.61 (11.66)	16.73 (12.26)	−2.88 (7.70)	0.010
EQ VAS	57	68.11 (20.08)	71.88 (20.38)	3.77 (20.21)	0.164
EQ-5D _{index}	56	0.69 (0.19)	0.73 (0.20)	0.04 (0.14)	0.022

Standard deviation (SD), EuroQol health status (EQ-5D_{index}), EuroQol self-rated health (EQ VAS), Oswestry Disability Index (ODI), Numerical rating scale 0–10 for back pain intensity (NRS).

for acute back pain patients could suggest a chiropractic treatment effect, which would be in line with previous studies indicating that chiropractic care may improve pain and disability in short-term (Goertz et al., 2013; Statens beredning för medicinsk utvärdering, 2010; Walker et al., 2010). However, it has been suggested that 90% of patients with acute low back pain recover within six weeks (van Tulder et al., 2006), which may also help explain the current findings of rapid improvements. The observed improvement of pain intensity was of MCID and maintained over the study period for acute back pain patients. Nonetheless, the observational study design and lack of control group makes it impossible to distinguish potential chiropractic treatment effects on pain reduction from the natural progression of back pain. It may further be assumed that patients with acute back pain might naturally improve more in contrast to patients with chronic back pain. The most recent Swedish health technology assessment report (Statens beredning för medicinsk och social utvärdering, 2016), which addresses the knowledge gap of the effectiveness of manipulative therapies in the management of acute and sub-acute low back pain, requests more

Table 3
Description of EQ-5D dimensions at baseline and at four weeks.

	Acute (n = 79)				Chronic (n = 56)			
	Baseline		4 weeks		Baseline		4 weeks	
	n	%	n	%	n	%	n	%
Mobility								
No problem	43	(54.4)	69	(87.3)	38	(67.9)	42	(75.0)
Moderate problem	36	(45.6)	10	(12.7)	18	(32.1)	14	(25.0)
Severe problem	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Self-care								
No problem	68	(86.1)	77	(97.5)	55	(98.2)	53	(94.6)
Moderate problem	11	(13.9)	2	(2.5)	1	(1.8)	2	(3.6)
Severe problem	0	(0.0)	0	(0.0)	0	(0.0)	1	(1.8)
Usual activities								
No problem	39	(49.4)	69	(87.3)	31	(55.4)	39	(69.6)
Moderate problem	35	(44.3)	9	(11.4)	24	(42.9)	17	(30.4)
Severe problem	5	(6.3)	1	(1.3)	1	(1.8)	0	(0.0)
Pain/discomfort								
No problem	5	(6.3)	39	(49.4)	2	(3.6)	7	(12.5)
Moderate problem	64	(81.0)	40	(50.6)	50	(89.3)	46	(82.1)
Severe problem	10	(12.7)	0	(0.0)	4	(7.1)	3	(5.4)
Anxiety/depression								
No problem	65	(82.3)	69	(87.3)	35	(62.5)	49	(69.6)
Moderate problem	14	(17.7)	10	(12.7)	21	(37.5)	17	(30.4)
Severe problem	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)

Table 4
Back pain intensity (numerical rating scale, 0–10) of patients with acute back pain after two and four weeks by subgroup characteristics.

	Total	Baseline	2 weeks	4 weeks	
	n	Mean	Mean	Mean	
Age					
18–44 years	22	4.97	2.01	1.50	*
45–64 years	34	5.06	1.93	1.79	*
Sex					
Women	28	4.64	2.15	1.91	*
Men	39	4.89	1.96	1.59	*
Occupation					
Manual workers	22	4.75	2.46	1.79	*
Non-manual workers	32	5.12	1.62	1.69	*
Co-morbidity					
Yes	24	5.08	2.01	1.59	*
No	43	4.61	2.05	1.79	*
Sick leave					
Yes	14	4.74	1.20	0.85	*
No	53	4.79	2.26	1.95	*
Treatment by other practitioner					
Yes	12	3.58	3.38	2.15	*
No	55	5.04	1.74	1.63	*

*Post-hoc test detected significant differences from baseline to both two and four weeks at $p < 0.05$ within this group.

clinical research of available treatments in this area. Accordingly, the current study's PRO findings of acute back pain patients receiving chiropractic care might contribute towards generating hypotheses and informing larger scale clinical studies in this requested area of research.

The back disability ODI values reported at baseline among patients with acute pain in this study were similar to what patients in the general population with acute back pain report (Rabin and de Charro, 2001). The ODI results in this study also followed the same pattern as the EQ-5D_{index}, where patients with acute pain reported similar disability/function after four weeks as the general population without disability/function (Rabin and de Charro, 2001). This could be an indication that patients with acute pain recovered at the end of study, but should be interpreted carefully as the characteristics of the study populations may differ.

The baseline EQ-5D_{index} for patients seeking chiropractic care

was similar to general Swedish population estimates for people with back pain (Burstrom et al., 2001b). This suggests that the health status of patients seeking chiropractic care does not differ substantially from the patients with back pain in the general population. Pain/discomfort was the EQ-5D dimension where most patients reported problems at baseline, followed by usual activities and mobility. Self-care was the EQ-5D dimension where the fewest patients reported problems. This is similarly shown in the general population in Stockholm where pain/discomfort is also among the main reported problems, whereas self-care is the least (Burstrom et al., 2001a). After the last follow-up at four weeks, patients who received chiropractic care for acute back pain reported similar EQ-5D_{index} after two and four weeks as the general Swedish population without pain (Burstrom et al., 2001b). This improvement suggests a normalization of back pain over time that may have been related to the chiropractic care although it is possible that the same rapid improvements could have occurred due to the natural history of back pain. Even so, the current study adds new knowledge with details about changes in EQ-5D health status for patients seeking chiropractic care. Similarly, and in line with the reported positive improvements of health status following chiropractic care, a recent US study suggests that the majority of chiropractic users report that chiropractic helps to improve their overall health or well-being (Adams et al., 2017).

There are numerous previously reported clinical studies on chiropractic. However, these are typically based on chiropractic practice in the US and English speaking countries, and there is a scarcity of studies that describe routine chiropractic care in Sweden. Thus relevantly, this study adds to the literature by describing and contextualising standard PRO of patients receiving chiropractic care in Sweden. This may be of value since chiropractic can be considered a marginalised, albeit regulated and licensed, health profession in Sweden, e.g. considering that chiropractic is mainly taught outside of medical universities and that the vast majority of Swedish chiropractors work in private practice outside of conventional medical settings. Building on the current observational study, future studies may want to investigate the comparative effectiveness of chiropractic care versus treatment as usual, as well as barriers and facilitators of integrating chiropractic and conventional care, for the target group of patients with non-specific low back pain. Notably, interdisciplinary pain rehabilitation may be a relevant treatment option for patients suffering from persistent back pain that does not respond to usual care or monotherapy (Chou et al., 2009). Future studies addressing chronic back pain groups might also want to consider longer follow-up periods (Lidwall, 2011).

4.1. Methodological considerations

Strengths of the current study include that the chiropractic clinics were geographically distributed throughout Sweden, of varying size, some having conventional care contracts, and that the chiropractors at each clinic had different lengths of working experience, which may aid to the study's representativeness of general chiropractic practice. Study limitations include the observational single arm study design which limits causal relations between observed outcomes changes and chiropractic care, the convenience sampling of patients and the non-randomized inclusion of chiropractic clinics which may have caused selection bias where the most "ambitious" or appropriate clinics or patients chose to participate (Machin and Campbell, 2005). Additionally, the lack of specific data on the type and content of administered chiropractic treatments, such as which exact techniques were utilized, and the fairly large number of drop-outs, which had more young patients and manual workers than the responders remaining in the

study, are limitations that ought to be considered when interpreting the results of this study and when planning for future investigations. The short follow-up period of four weeks, and the lack of references detailing scientifically validated translations of the implemented instruments into Swedish constitute additional aspects that might be considered in future studies. The findings may not be generalizable to the general population with back pain, as patients seeking chiropractic care might differ in characteristics from those who do not.

5. Conclusions

Patients with acute back pain reported statistically significant and MCID improvements in back pain intensity, back disability and HRQoL, and statistically significant improvements in self-rated health, over four weeks following chiropractic care. Patients with chronic back pain reported statistically significant albeit smaller and non-MCID changes for all PRO except self-rated health. The observed improvements in PRO may be of interest for clinicians and decision makers involved in the management of back pain patients. The study findings may contribute to inform future research in the field of chiropractic care and back pain.

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