



Utilization of Low Back Pain Patient Reported Outcome Measures Within Chiropractic Literature: A Descriptive Review

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ABSTRACT

Objective: The purpose of this review was to determine the most commonly reported and utilized low back pain (LBP) Patient Reported Outcome Measures (PROMs) within the chiropractic literature and to investigate their temporal and methodological publication characteristics.

Methods: A systematic search of English-language publications in 5 electronic databases (PubMed, Cochrane [CENTRAL], CINAHL/EBSCO, PsycINFO, and Index to Chiropractic Literature) was conducted for articles published from the inception of each database through June 2016.

Results: One hundred forty-four articles were retrieved that utilized 75 different LBP PROMs. The 4 most commonly used LBP PROMs in the chiropractic literature were the Oswestry Disability Index, Numeric Rating Scale, Visual Analogue Scale, and Roland Morris Questionnaire.

Conclusions: This research has created a unique list of the most commonly used LBP PROMs within the chiropractic literature. (*J Manipulative Physiol Ther* 2018;41:628-639)

Key Indexing Terms: *Low Back Pain; Manipulation; Chiropractic*

INTRODUCTION

Low back pain (LBP) is a major health issue because of its high prevalence and associated high financial cost to both the individual and the government.¹ It is estimated that 80% of people will be burdened by back pain at some point in their lifetime,² and despite the increase in intervention options, functional disability, as a result of chronic LBP, has increased in recent decades.³

To enable quality assurance in health care, it is important to document treatment outcomes appropriately, especially for common disorders, such as LBP. Patient Reported Outcome Measures (PROMs) are defined as “any report of the status of a patient’s health condition that comes directly from the patient without interpretation of the patient’s response by a clinician or anyone else.”^{4,5} When used

appropriately, PROMs can measure a patient’s perspective on their treatment progress, or the lack thereof, in 3 critical areas: pain management, physical capacity (impairment), and disability (activity intolerance).⁶

The application of outcome measures for clinical decision-making is increasingly becoming more patient centered. Applying PROMs correctly, when treating patients with LBP, could enable chiropractors to provide accurate evidence of treatment outcomes. Outcome measures in health care have been documented since the 1980s.⁷ Since their introduction into health care, a significant amount of research has been conducted with regards to their validity, reliability, sensitivity, and responsiveness; however, there has only been limited research completed regarding their implementation.

The primary aim of this study was to review the literature to determine the utilization of PROMs for LBP within chiropractic literature. Secondary aims were to investigate temporal and methodological (study design) publication characteristics.

METHODS

To achieve the aims of this study, a literature review was conducted. Reviews of the literature are commonly utilized within health care to collectively evaluate independent research and scientifically designed to ensure findings are consistent across populations.⁸

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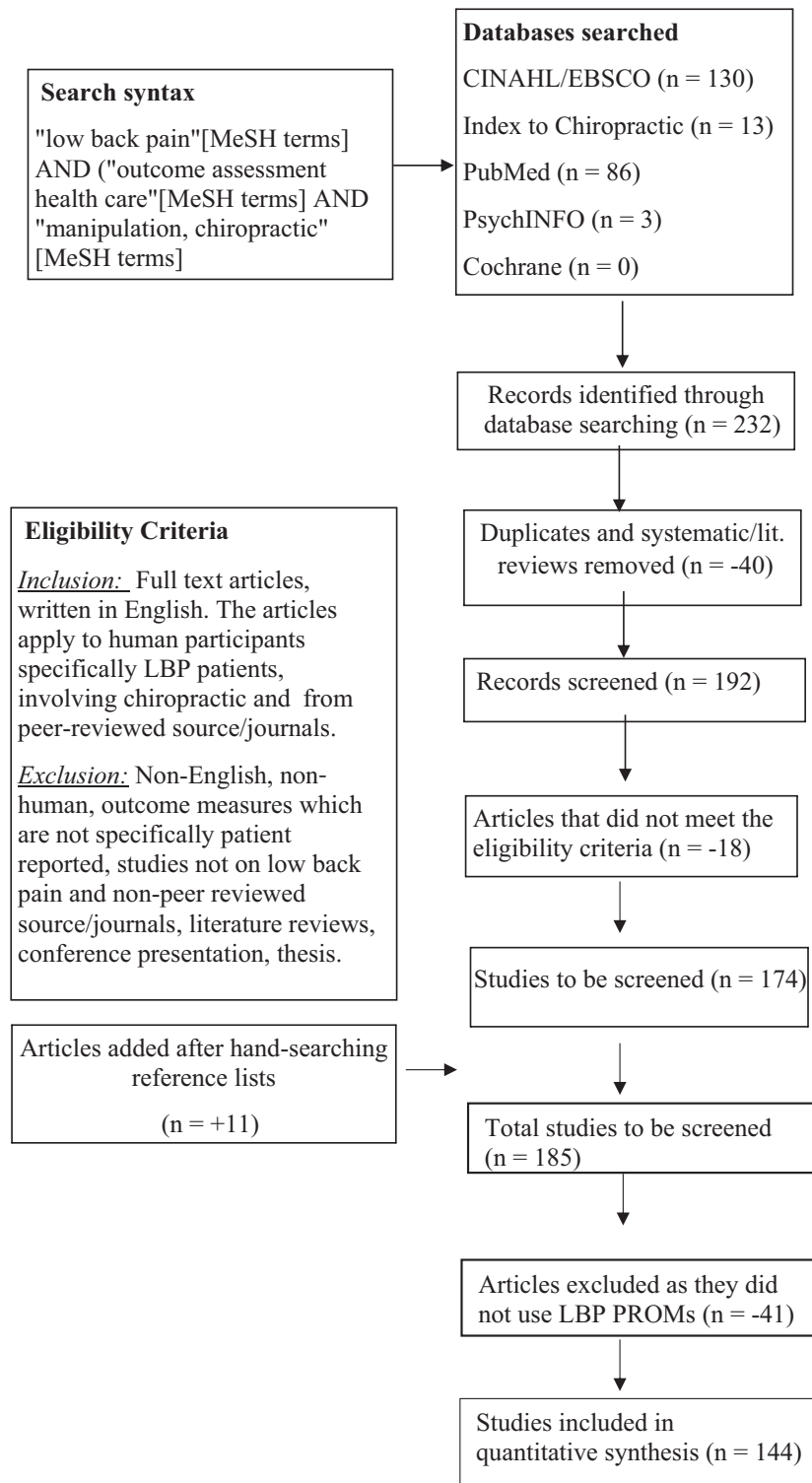


Fig 1. Preferred reporting items for systematic reviews and meta-analyses flow chart. LBP, low back pain; PROMs, patient reported outcome measures.

This review was designed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement as a guide (Fig 1).⁹ The project utilized quantitative

research methodology in the form of descriptive statistics to produce numerical data and examine inherent trends in LBP PROMs within the chiropractic literature.

Inclusion and Exclusion Criteria

Eligibility criteria for article inclusion were full-text, peer-reviewed, English-language articles applied to participants with LBP that included chiropractic and PROMs. For the purpose of this review, chiropractic literature was defined as “articles written by chiropractors or which included chiropractic treatment or methods.” Exclusion criteria included articles, which were in a language other than English; outcome measures, which were not specifically patient reported; studies not on LBP and non-peer-reviewed sources or journals. Literature reviews, conference presentations, theses, and dissertations were also excluded.

The following search terms were used and are further detailed in Appendix 1 (available online):

1. Low Back Pain
2. Patient Reported Outcome Measures, Outcome Assessment
3. Chiropractic, Manipulation
4. Low Back Pain AND Patient Reported Outcome Measures AND Chiropractic

Information Sources and Search Strategy

Five electronic databases (PubMed, Cochrane [CENTRAL], CINAHL/EBSCO, PsycINFO, and Index to Chiropractic Literature) were systematically searched using MeSH terms, non-MeSH terms, and a combination of terms and “free text” words from database inception to June 16, 2016. Only articles pertaining to the use of LBP PROMs within the chiropractic literature were sourced. The search was conducted to source studies with the following designs: randomized control trials (RCTs), cohort studies, case control studies, case reports, case series, and cross-sectional studies.

Studies were retrieved from the results of the combined electronic database search and duplicates were removed. Titles and abstracts were screened for inclusion and exclusion criteria. The reference lists of included studies were then searched (backward snowballing) to further identify potential articles that may have been missed by the electronic search (Fig 1).

Data Extraction and Synthesis

Data extraction is the basic study descriptors that are extracted, including the author, year of publication, title of article, the source of publication, and the LBP PROM used. Data synthesis was used to provide an overview of the topic, identify knowledge gaps, and obtain population specific information. In addition, a list of the most frequently used PROMs for LBP in chiropractic literature was compiled.

Data analysis of descriptive statistics were utilized to provide basic summaries of the findings. The results were presented as both numerical figures reporting LBP PROMs frequency and also as descriptive information stating the type of LBP PROM. Tabulated data commenting on the frequency of LBP PROMs and descriptions of the data are presented in the Results section.

No risk of bias assessment was conducted on the retrieved articles because the aim of the research was to document the use of PROMs in the literature, not to assess the PROMs in terms of appropriateness, effectiveness, reliability, or validity.

RESULTS

Study Selection Results of the Most Frequently Used LBP PROMs

The results of the literature search processes are illustrated in Figure 1. A total of 144 articles were identified that used LBP PROMs within chiropractic research.¹⁰⁻¹⁵³ A total of 75 different PROMs were identified from within these articles.

The 4 most commonly used LBP PROMs in the chiropractic literature were Oswestry Disability Index (ODI), Numeric Rating Scales (NRS), Visual Analogue Scales (VAS), and the Roland Morris Questionnaire (RMQ). The ODI was the most commonly utilized LBP PROM, with the full version utilized in 47 articles compared to the modified and revised versions, which were utilized 11 times.

The 75 LBP PROMs identified within the research articles were assessed as being diverse, regarding their aim and application. In 9 of the 144 articles evaluated, researchers created their own versions of LBP PROMs, and these included versions of PROMS often made up from a series of questions tailored to the outcomes being examined (Table 1).

Study Designs That Utilized LBP PROMs

As the classification of study designs can vary, the original author’s description of the study design was used to classify the type of study. The 3 most common study methodologies that utilized LBP PROMs were RCTs; case reports, studies, and series; and cohort studies (see Table 2). Randomized control trials represented 37.5% of the articles included in this review, with case reports, studies, and series seen in 22.2% of the articles and cohort studies accounting for 11.1%.

Year of Publication and Temporal Frequency of LBP PROM

The first recorded occurrence of LBP PROMs in chiropractic literature, within the articles evaluated, was in 1986¹¹¹ (Fig 2). There was a 5-year gap before the next PROM appeared in 1991, followed by another hiatus until 1995. After this date, PROMs appeared in the literature each year, albeit in limited amounts, until the start of the millennium when there was an exponential increase in the

Table 1. *Frequency of LBP PROMs*

PROM	Frequency (n)
Oswestry Disability Index (47 full version, “revised” version 8 and “modified” version 3)	58
NRS (in a variety of forms, including a 0-10 scale line, 0-10 boxes, 0-5 Likert scale, 0-100)	54
VAS	41
Roland Morris Questionnaire (35 full version, 4 modified version, 1 Danish version)	40
SF 36 (21 SF 36; 2 RAND 36; 1 SF 36, bodily pain section only; and 1 SF 36, physical functioning section only)	25
Bournemouth	12
Unvalidated LBP PROMs	9
Fear Avoidance Beliefs Questionnaire	6
Pain diagram	5
SF 12 (2 physical and 1 mental version), Waddell Scale (1 each for behavioral, physical function, disability index, and 1 not specified), Patient Satisfaction Questionnaire, Patient Global Impression of Change, Bothersomeness Scale	4
Pain Disability Index, Functional Rating Index, Dartmouth Primary Care Cooperative Information Project chart, Quebec, Quadruple VAS	3
Pain Catastrophizing Scale, reporting work absence, back pain functional scale, Keele Subgroups for Targeted Treatment (STarT) back screening tool, Quality of Life Questionnaire, modified version of the Health Care Providers Pain and Impairment Relationship Scale, Quadruple NRS, Dallas Pain Questionnaire, Tampa Scale of Kinesiophobia, McGill Pain Questionnaire, Beck Depression Index	2
Danish Roland Morris Disability Questionnaire, Major Depression Inventory, Orebro Pain Questionnaire, Health Questionnaire, Community Epidemiologic Scale-Depression, minimal acceptable outcome, Kellner’s Symptom Questionnaire, instrumental activities of daily living scale, Patient Self-Assessment Form, SF 36 bodily pain section only, SF 36 physical functioning section only, modified Sickness Impact Profile, FABQpa, Multidimensional Pain Inventory, FABQw, Aberdeen Back Pain Scale, Pediatric VAS, Rinion’s Brief Depression Scale Questionnaire, Global Well-being Scale, Profile of Mood States, Depression Scale (no further details), treatment satisfaction scale, Pain Diary, Pain Catastrophizing Scale, TSK-11, Pain Self-Efficacy Questionnaire, The Survey of Perceived Organizational Support, Global Wellness Scale, Daily Living Health Questionnaire (SF 36), Retrospective Health, Wellness and Overall Quality of Life Self-Assessment Questionnaire, Falls Efficacy Scale, Patient Reported Outcomes Measurement Information System 29, RAND (no further information given on the specific RAND used), State Anxiety Index, Patient Specific Functional Scale, Zung disability questionnaires, Quality of Well-Being Scale, Patient Health Questionnaire 9, Measurement Information System (PROMIS)-29, Unspecified “Pain Scales,” Global Improvement Scale	1

FABQpa, fear-avoidance belief questionnaire physical activity; *FABQw*, fear-avoidance belief questionnaire work; *LBP*, low back pain; *NRS*, Numeric Rating Scale; *PROMIS*, patient health questionnaire; *PROMs*, patient reported outcome measures; *SF*, short form; *TSK-11*, Tampa scale for kinesiophobia; *VAS*, visual analogue scale.

number of PROMs that peaked in 2005. Since then, there has been both relatively high and low years of PROMs featured in the literature, with a surprisingly low number published in the last 2 years (2015-2016).

DISCUSSION

This is the first study to research the utilization of LBP PROMs in the chiropractic literature. Although the aim of this study was to identify PROMs specific to LBP within the chiropractic literature, the study also revealed numerous PROMs not exclusive to LBP. For example, PROMs evaluating depression and anxiety also were used for patients experiencing LBP. The likely reason for this is that

LBP, particularly chronic or persisting, is often associated with other comorbidities, such as depression and anxiety. According to Rej et al,¹⁵⁴ “Depression and chronic low back pain (CLBP) are both frequent and commonly comorbid in older adults seeking primary care.”¹⁵⁵ Eleven of the 75 PROMs identified evaluated depression and anxiety in an LBP population. In addition, other PROMs (eg, Dallas pain scale and Örebro Musculoskeletal Pain Questionnaire) incorporated questions pertaining to the patient’s mood and mental health within the instrument.

Using standardized PROMs for LBP in clinical practice allows practitioners to monitor a patient’s health status and the response to treatment from the patient’s standpoint. They also enable effective communication between health care providers and health care funders.⁶ Yeoman and

Table 2. Study Design Frequency (as Determined by the Original Author)

Study Design	Frequency (n)
Randomized control trials	54
Case study/case report/case series	32
Cohort study	16
Validity study	9
Observational study	6
Feasibility study, practice-based study, cross-sectional survey, prospective clinical trial, prospective study	10 (2 of each)
Efficacy study, pilot study, follow-up study, prospective outcome study, research report, survey (descriptive), practice-based research project, reliability study, retrospective review, meta-analysis, explanatory study, retrospective study, prospective descriptive study, longitudinal evaluation study, explanatory study, report from a consensus process, cross-sectional questionnaire survey	17 (1 of each)

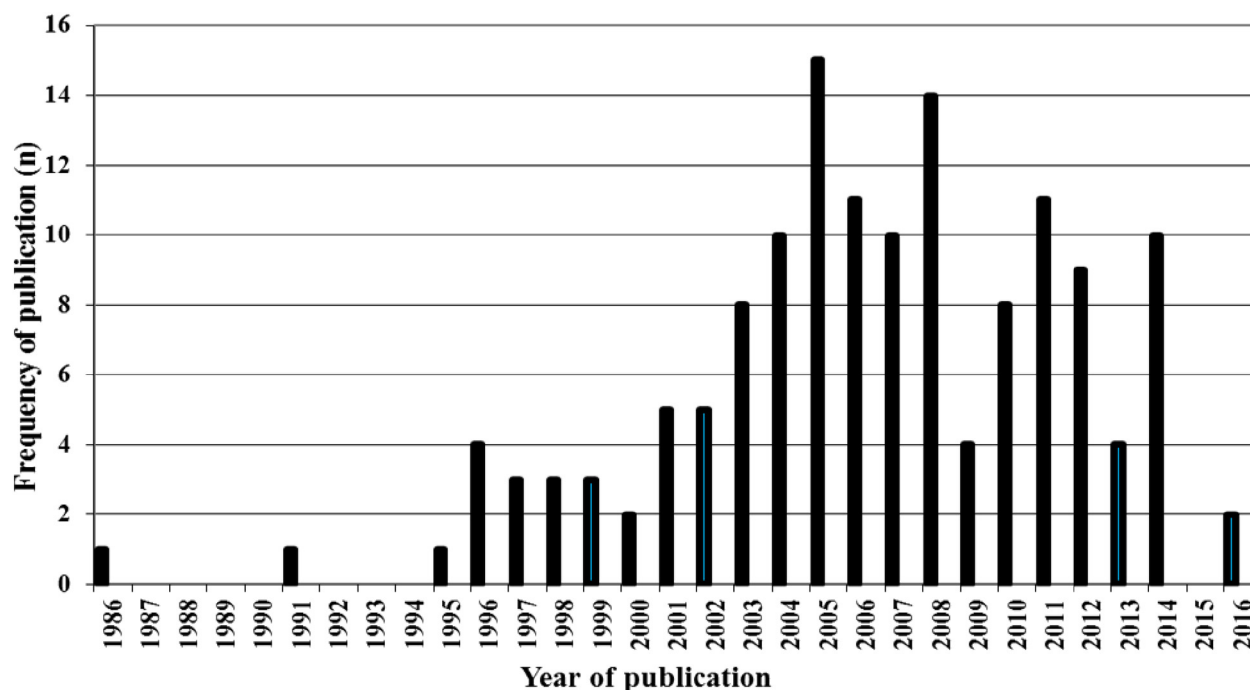


Fig 2. Article frequency by year of publication.

Liebensen⁶ stated that PROMs can be applied in clinical practice to gain knowledge from a patient's perspective and to aid in the justification of the cost to private or public organizations.

Deyo et al¹⁵⁶ stated that "the use of all interventions for treating chronic LBP increased from 1995 to 2010," because consumers were offered more treatment choice, and using PROMs could be utilized more to aid in consistency across health care professions. This time period is reflected in this study's temporal data, with an increase in

the frequency of PROMs appearing in the literature over these years. In the present climate of increasing pressure on clinicians to base their decision-making processes on sound research evidence, PROMs are becoming more essential. Information from PROMs may be useful for the patient, the practitioner, and third-party funders, for example, private insurance companies or the public health care system. Patient Reported Outcome Measures are highly effective as a means to monitor a health status and to enable shared decision-making and should be encouraged in clinical practice.¹⁵⁷

Research indicates that when health care providers engage in shared decision-making with the patient, the quality and safety of health care rises, financial burdens are decreased, and an increase in both provider and patient satisfaction occurs.¹⁵⁸ The current utilization of PROMs for LBP among chiropractors in clinical practice remains unknown, and there is a need to investigate PROMs within clinical settings. It is vital that further research is undertaken in this area.

Most Commonly Utilized PROMs

This review found that the most commonly utilized PROM in the chiropractic literature was the ODI. The ODI is considered the most commonly used disease-specific PROM to measure functional disability in LBP patients within health care.¹⁵⁹ The full version of the ODI was utilized in 47 of the 144 articles, with modified versions utilized in 11. Modified or revised versions of PROMs can remain valid and reliable when appropriately assessed, with the most common reasons for modifying a PROM being translation into another language, shortening the instrument, or tailoring it to the objectives of the research.¹⁶⁰

The second most commonly used LBP PROM in chiropractic literature was the NRS. The NRS is a universal pain screening instrument, with a 0 to 10 scale measuring pain intensity that has been widely implemented in most health care disciplines¹⁶¹ and within many research settings.¹⁶² The literature supports the NRS as both a reliable and valid method of measuring pain intensity across many populations.¹⁶² In addition, it is a popular pain screening test because of its concise design and easy application.¹⁶³

Within this review, the VAS was the third most common LBP PROM because it was cited in 28.5% of reviewed articles. Like the NRS, the VAS is an instrument in which respondents specify pain intensity by indicating a position along a line between 2 end points.¹⁶⁴ Subjective pain severity is most commonly measured using unidimensional scales such as the VAS and NRS.¹⁶¹ These self-reporting, unidimensional scales are the instruments most often used to measure pain intensity or severity in both practice settings and in treatment-outcome research.²² The VAS has long been assumed to be the most sensitive pain intensity measure simply because it provides an infinite number of response categories between 2 extremes of pain.²² From a research, clinician, and a patient perspective, this instrument is very simple to administer and complete, and there is very little possibility for misinterpretation or language barrier issues.

The fourth most frequently cited LBP PROMs in the chiropractic literature was the full version of the RMQ, which was utilized in 27.8% of articles, with the modified version being used in a further 2.8%. The RMQ has been

used extensively in health care since the 1980s, with validity and reliability testing demonstrating strong psychometric properties and high validity.⁷ The sensitivity and specificity testing of the revised version of the RMQ, the RMQ-18, demonstrated identical metrics compared to the full version.¹⁵⁷ The RMQ is an instrument that yields reliable measurements, which are sensitive to change and can predict the level of disability in patients with LBP.¹⁶⁵

It is currently poorly documented in the literature as to why some PROMs are used more commonly than others. Some instruments have stronger psychometric properties than others, which might make them a more popular option because validated PROMs are more likely to be accepted by researchers and journal editors. There is also likely to be a snowball effect, whereby the more commonly utilized and published PROMs are considered acceptable or endorsed and are more likely to be the preferred choice for other researchers and clinicians.

Study Design

The results of this research demonstrated that the most common study designs that used LBP PROMs were RCTs; case reports, studies, or series; and cohort studies. The original author's description of the study design was used to classify the studies.

Patient Reported Outcome Measures are routinely used in RCTs to determine the effectiveness of an intervention.¹⁶⁶ In clinical trials, PROMs provide a method of systematically and accurately gathering the patient's perspectives, with respect to symptoms or response to interventions and treatment. Within a research setting, the use of poor quality instruments in a clinical trial or study can have serious consequences and would likely decrease the credibility of the results.¹⁶⁶ There are multiple factors that may dictate the choice of PROMs within particular research settings. These many include the previous utilization of the PROM in similar studies, utilization by a competitor, or their availability in a wide range of languages.¹⁵⁸ The literature indicates that the use of PROMs are firmly embedded within both clinical and research settings and is likely to continue to play a prominent role in the future.

Temporal Evolution of PROMs

While the first occurrence of LBP PROMs within the chiropractic literature occurred in 1986,¹¹¹ some PROMs have been available for a considerable time. The VAS appears to be the earliest reported PROM and was created in 1921.¹⁶⁷ Shortly followed by the creation of Likert scales in the 1930s.¹⁶⁷ The most common PROM in this research, the ODI, was created by John O'Brien in 1976 and was presented at the meeting of the International Society for the Study of the Lumbar Spine in 1981.¹⁶⁸ The last decade has

seen an increasing focus and interest in documenting the patient's experience in their interactions with health care providers and systems.¹⁵⁸ In 2012, with the arrival of the "era of accountability" and a firm consensus on the need for assessment and accountability, new demands have been placed on health care providers.¹⁶⁹ This is potentially a reason why the results of this research concluded that after the year 2001, LBP PROMs were more frequently cited in chiropractic literature. Complementary and alternative medicine therapy utilization has increased within the general public and is also likely to be a reason for the increase in research in these professions.¹⁷⁰

Limitations

Low back pain is a vast topic, and there is an enormous amount of literature available on the topic. Because of this, and the complexity of the topic, there may have been articles missed during the search process. However, the systematic electronic search used 5 databases that are most commonly used within health and medical research. Furthermore, reverse snowballing of reference lists was applied to the search process. Another potential limitation of the study was that the quality of the articles retrieved was not evaluated; however, the aim of this research was not to assess the quality of the literature available, but to simply comment on which LBP PROMs were utilized. Comparing the quality of articles with the PROMs used is a topic for further research.

When discussing the type of studies discovered in this search, there are multiple categorizations that can be used to determine the study design. Within literature, there is some variation regarding exact definitions of study designs; therefore, within this study, the original author's description of the study design was used and noted as a limitation.

This study aimed to create a list of the most commonly used PROMs for LBP within the chiropractic literature, with the temporal frequency as a secondary research focus. While this does give useful information on the occurrence of PROMs in the LBP literature, it does not present it as a percentage of all LBP articles. Hence, the increase of PROMs identified since the millennium might be due to an overall increasing number of articles published during this period. This is a further limitation of the study.

CONCLUSION

The systematic search revealed 144 articles, which utilized LBP PROMs within their research. The 4 most commonly used LBP PROMs in chiropractic literature are the ODI, NRS, VAS, and RMQ.

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jmpt.2017.11.007>.

FUNDING SOURCES AND CONFLICTS OF INTEREST

No funding sources or conflicts of interest were reported for this study.

CONTRIBUTORSHIP INFORMATION

Concept development (provided idea for the research): N.C.C., A.G.S., S.E.

Design (planned the methods to generate the results): N.C.C., A.G.S.

Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): N.C.C., A.G.S.

Data collection/processing (responsible for experiments, patient management, organization, or reporting data): N.C.C., A.G.S.

Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): N.C.C., A.G.S.

Literature search (performed the literature search): N.C.C.

Writing (responsible for writing a substantive part of the manuscript): N.C.C.

Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): N.C.C., A.G.S.

Practical Applications

- The 4 most commonly used LBP PROMs in the chiropractic literature were the ODI, NRS, VAS, and RMQ.
- Low back pain PROMs are becoming more commonly utilized within chiropractic literature.
- After 2001, LBP PROMs were more frequently cited in chiropractic literature.

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