

Fall 12-12-2018

# The McKenzie Method and treatment of low back pain

Sylvia Meyer  
*James Madison University*

David Harrison  
*James Madison University*

Follow this and additional works at: <https://commons.lib.jmu.edu/pacapstones>



Part of the [Medicine and Health Sciences Commons](#)

---

## Recommended Citation

Harrison DE, Meyer SJ. The McKenzie Method and Treatment of Low Back Pain. JMU Scholarly Commons Physician Assistant Capstones. <https://commons.lib.jmu.edu/pacapstones/37/>. Published December 12, 2018.

This Article is brought to you for free and open access by the The Graduate School at JMU Scholarly Commons. It has been accepted for inclusion in Physician Assistant Capstones by an authorized administrator of JMU Scholarly Commons. For more information, please contact [dc\\_admin@jmu.edu](mailto:dc_admin@jmu.edu).

**The McKenzie Method and Treatment of Low Back Pain**

David Harrison, PA-S and Sylvia Meyer, PA-S  
James Madison University  
Physician Assistant Program  
December 2018

## ABSTRACT

**Objective:** To compare the McKenzie Method of Mechanical Diagnosis and Therapy (MDT) exercise program to other treatment modalities for reducing pain, disability, and improving function in patients complaining of low back pain. **Design:** Systematic literature review. **Methods:** Searches were conducted in PubMed and Google Scholar using terms “McKenzie Method”, “mechanical diagnosis and therapy”, “low back pain”, “spinal manipulation”, “physical therapy”, and “placebo”. **Results:** In Machado et al., a statistically significant difference was found between MDT and using a first line approach (advice, reassurance, and over the counter (OTC) analgesics) regarding pain; however, it did not meet the pre-established level of clinical importance. In Peterson et al., improvement in disability was greater in the MDT group compared to the spinal manipulation group; additionally, MDT had better adherence and completion of therapy than spinal manipulation. In Paatelma et al., there was no statistical significance between MDT and the orthopedic manual therapy group. However, there was statistical significance between MDT and the advice only group at 12 months for improvement in pain. **Conclusion:** Statistical significance was present in some outcomes; however, clinical significance was low when comparing MDT to other treatment modalities. Patients who received MDT had a perceived improvement in their LBP. Most LBP in an acute episode will resolve with or without treatment. Further review is warranted to measure both long term outcomes (greater than 1 year) of LBP with MDT intervention and utilizing studies with a more uniformed methodology of conducting research.

Acronym Key	
LBP	Low back pain
MDT	Mechanical Diagnosis Therapy
OMT	Orthopedic manual therapy
OTC	Over the counter
RMDQ	Roland Morris Disability Questionnaire
VAS	Visual analog scale

## INTRODUCTION

Low back pain (LBP) is one of the most common medical complaints. It is a leading cause of disability worldwide. This condition leads to greater use of medical resources, lower productivity, and potentially lifelong impairment. Most individuals will experience an episode of acute LBP sometime in their life. Episodic events of acute LBP can eventually develop to chronic LBP.<sup>1</sup>

LBP is defined as non-specific, non-radicular pain with no associated neurological signs or symptoms. The pain is limited to the spine and/or paraspinal muscles of the lumbar region with no radiation to the leg. However, leg pain is a commonly associated complaint with LBP. The pain is mechanical, e.g. a herniated disc, and not due to an underlying pathology like a neoplasm or infection.<sup>2</sup> There are several approaches towards treating LBP: patient education and reassurance regarding disease process, physical therapy, spinal manipulation, analgesics, and surgery. One common modality is the McKenzie Method.

The McKenzie Method of Mechanical Diagnostic Therapy (MDT) approach was developed by Robin McKenzie, a physical therapist from New Zealand, in the 1950s, to treat back and extremity issues. MDT classifies the causes of LBP into three categories: postural syndrome, dysfunction syndrome, and derangement syndrome. Postural syndrome happens when position or posture overload the tissues for a long period of time, resulting in pain.<sup>3</sup> Dysfunction syndrome pain is due to the loading of compromised or impaired tissue.<sup>3</sup> In derangement syndrome (the most common diagnosis in MDT), there is a mechanical obstruction present, interfering with motion and causing pain.<sup>3</sup> A principle tenet of MDT is for the patient to learn to self-treat their condition and become independent of their provider.<sup>4</sup>

MDT is an appealing modality of treatment. It focuses on five areas of benefit: reliable assessment, early prognosis, focus on self-treatment, better outcomes, and prevention of recurrence. Reliable assessment is accomplished by identifying and making a correct diagnosis regarding treatment.<sup>5</sup> MDT uses an evaluation process stressing early prognosis thereby predicting realistic expectations the patient can have in as few as one to two visits.<sup>5</sup> MDT focuses on self-treatment, giving the patient ownership of their care and confident to treat their condition, independent of a provider. MDT evaluation helps determine who will benefit from treatment and who will require another modality.<sup>5</sup> This is illustrated by reducing surgery rates, avoiding surgical interventions, lowering treatment costs, and leads to better outcomes than other exercise approaches or spinal manipulation alone.<sup>5</sup> Finally, MDT allows patient to self-manage their care and initiate treatment themselves at any sign of recurrence.<sup>5</sup>

This study is important for several reasons. Due to the prevalence of LBP, this complaint will present in a variety of settings. Clinicians are not only required to make the proper diagnosis of LBP but also know the available treatment modalities. Providers can prescribe physical therapy utilizing the McKenzie Method as an option especially if the patient is limited by cost of care either due to being underinsured or uninsured.<sup>5</sup>

MDT utilizes a set of exercises which can be performed at home by the patient and does not require an extensive course of physical therapy (See Appendix 1 for examples of exercises). Additionally, it can provide an alternative to more invasive procedures, including surgery or steroid shots.<sup>5</sup> MDT attempts to reduce pain distribution through centralization, remodeling tissue, and/or adopting proper posture.<sup>4</sup> By decreasing the severity of symptoms and addressing the underlying cause of mechanical LBP, MDT provides clinicians an alternative to prescribing opioids. Finding alternatives for pain management not involving the use of opioids has increased in importance due to both abuse and diversion.<sup>6</sup>

## **CLINICAL QUESTION**

Among adults with LBP for any duration, does the McKenzie Method exercise program as compared to other treatments of LBP reduce pain, disability, and improve function in these individuals?

## **METHODS**

An initial search of PubMed and Google Scholar was performed in September 2016 using the terms “McKenzie Method”, “mechanical diagnosis and therapy”, “low back pain”, “back pain”, “spinal manipulation”, “physical therapy”, and “placebo”. This yielded 41 articles. After the duplicates were removed, articles were excluded if they were greater than ten years old, if they were not randomized control trials, or if non-OTC analgesics were used in the study to control pain. The 13 remaining articles were further screened and five were excluded due to author bias and a heavy focus on directional preference of back pain. Eight articles were individually reviewed and three randomized control trial articles were chosen to compare the McKenzie Method’s effectiveness as treatment for LBP. Reference Figure 1 for further explanation of article search review.

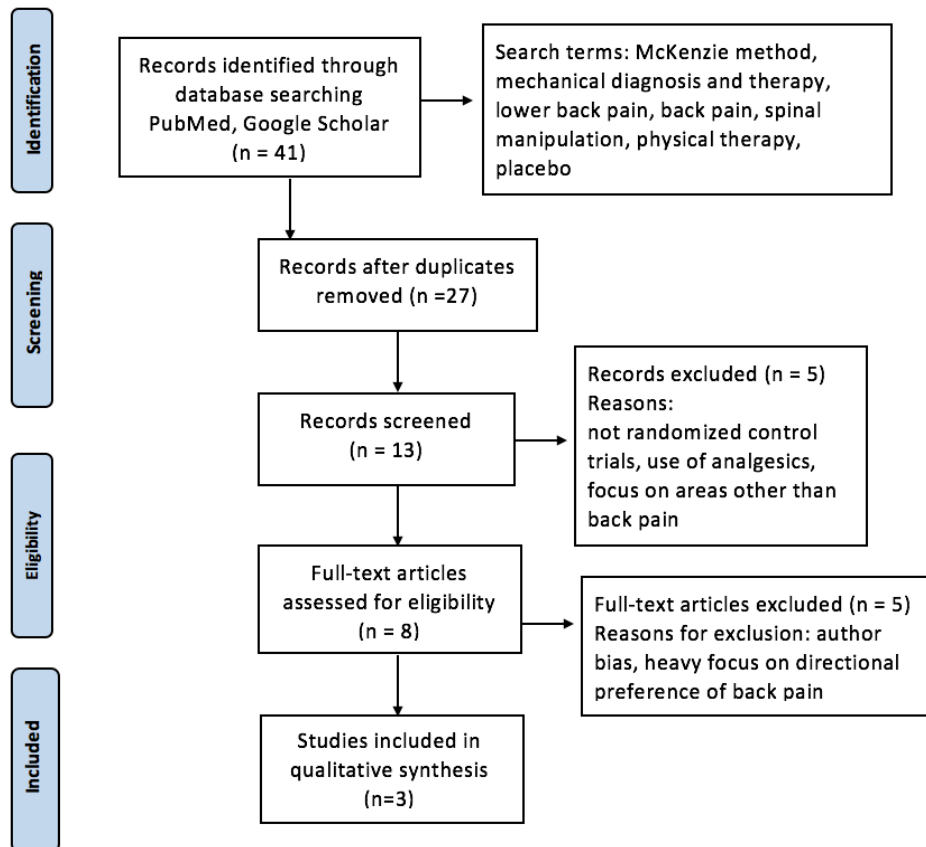


Figure 1. PRISMA flow diagram explaining article search review<sup>7</sup>

## RESULTS

### Study #1

*The McKenzie Method Compared With Manipulation When Used Adjunctive to Information and Advice in Low Back Pain Patients Presenting with Centralization or Peripheralization*<sup>8</sup>

Objective: A randomized control trial comparing the effects of the McKenzie Method to spinal manipulation in patients with greater than six weeks of LBP in conjunction with clinical advice and information.

### Study Design:

Patients with persistent LBP for greater than six weeks were referred by primary care physicians to the primary care specialist center in Copenhagen, Denmark from September 2003 to May 2007. Patients presented with clinical signs of disc-related symptoms with either centralization or peripheralization of symptoms. Centralization refers to pain moving proximally from the extremity to the spine while peripheralization refers to pain moving distally from the spine towards the extremities. Full inclusion and exclusion criteria can be referenced in Table 1.

Table 1. Subject Inclusion and Exclusion Criteria; *Peterson et al 2011*

<b>Inclusion Criteria</b>
18-60 years of age LBP for more than six weeks Able to speak and understand Danish language Centralization or peripheralization of symptoms
<b>Exclusion Criteria</b>
Free of symptoms at day of inclusion Problems with language or communication Comorbidities present Recent surgery Could not be examined due to pain Spondylolysis, fracture or osteoporosis Signs of severe nerve root involvement Inflammatory arthritis Disability pension Pregnancy

LBP- low back pain

Initial screening was performed by a physical therapist trained in MDT, who was unaware of the treatment assignments. Researchers employed computer randomization for assignment of patients to the two therapeutic treatments, McKenzie group performed by certified therapists and spinal manipulation group performed by chiropractors.

The McKenzie treatment group received MDT, in which vertebral mobilization and high velocity thrusts were prohibited as MDT does not involve aggressive manual manipulation. Treatment was performed by therapists credentialed in MDT. Educational booklets were distributed to some patients based on the therapist discretion. The spinal manipulation treatment group received all types of manual techniques including vertebral mobilization, high velocity thrusts, and myofascial trigger-point massage. Three chiropractors, with several years of clinical experience, provided spinal manipulation therapy. Both treatment groups were educated on the importance of maintaining physical activity and given "The Back Book" for informative purposes.

Over the 12 weeks of treatment, both groups received up to 15 treatment sessions. All patients were educated on mobilization, stretching, stabilization, and strengthening exercises, which were chosen by the therapist or chiropractor based on treatment goals of each patient. Patients were instructed to seek no additional care until two months after the last treatment was done and to continue the exercises themselves during this transition.

Success of patients at the two month follow up was the main outcome measure of this study. Treatment was deemed successful based on scoring of Roland Morris Disability Questionnaire (RMDQ), a 24-item self-report questionnaire rating LBP effects on functional activity. A score reduction of five points or a total score less than five points indicated success of either treatment group. LBP was rated on a questionnaire that was composed of: LBP at the moment, the worse LBP within the past two weeks, average level of LBP in the past two weeks. Scores were summarized with a score of zero meaning no back pain at all and score of 60 meaning worst possible back pain on all items. Other outcomes measured include reduction in disability, pain changes, return-to-work, global perceived effect and satisfaction with treatment. A researcher blinded to treatment groups followed up at two months. Statistical analysis was completed by one statistician with no information regarding randomization.

### Study Results:

574 patients were screened and 350 patients were chosen with 307 showing centralization and 43 showing peripheralization, divided into 175 patients per treatment group. Baseline characteristics were similar between the two treatment groups with the exception of more sick leave usage due to LBP noticed within the McKenzie group as compared to the spinal manipulation group. 36 participants withdrew from the McKenzie group and 55 participants withdrew from the manipulation group for reasons attributed to lack of effect and reasons not attributed to lack of effect.

Post-Treatment: The number of patients who reported global perceived effect (improvement noticed by patient regardless of treatment modality) at the end of treatment for the McKenzie group showed a statistically significant difference of 13% when compared to the manipulation group ( $p=0.016$ ). 77% of the McKenzie group and 82% of the manipulation group reported satisfaction with treatment.

2 Month Follow-Up: The difference between disability reduction between the two groups went from 0.7 post-treatment to 1.5 at two month follow-up, with a statistically significant difference of 12% in favor of the McKenzie group ( $p=0.02$ ).

12 Month Follow-Up: The McKenzie group maintained the 1.5 difference in disability reduction as compared to the manipulation group at the 12 month follow-up. There were no other statistically significant differences.

Over half the patients in both treatment groups reported success at each assessment time, with the greatest success for the McKenzie group being at the 2 month follow-up with 71% satisfaction of participants. The greatest success for the spinal manipulation group was found at the 12 month follow-up with a participant satisfaction rate of 62%. There was a mean reduction of disability amongst both groups by over 50% at the end of treatment. Reference Table 2 for full data compilation from results. A *post hoc* test for interaction found there was no statistical influence between centralization/peripheralization on the association between treatment group and success rate. The McKenzie method appeared to be the more favorable treatment option. However, the between-group differences were not very large.



Table 2. Outcomes at Post-treatment, 2 Month Follow-up, and 12 Month Follow-Up. *Peterson et al 2011*

Outcomes	Post-Treatment		2 Month Follow Up		12 Month Follow Up	
	McKenzie Group	Manipul. Group	McKenzie Group	Manipul. Group	McKenzie Group	Manipul. Group
Success (# with success/total #)	116/172 (67%)	98/163 (60%)	120/168 (71%)	95/161 (59%)	113/161 (70%)	101/163 (62%)
Reduction in disability*	6.5	5.8	6.7	5.2	7.1	5.6
Reduction in pain**	15.3	13.8	14.4	13.0	15.0	12.2
Days off work or school in past 4 weeks	5.1	4.4	3.8	3.4	3.2	1.9
Global perceived effect (# with global perceived effect/total #)	81/169 (48%)	53/153 (35%)	-	-	-	-
Satisfaction with treatment (# satisfied/ total #)	133/173 (77%)	133/163 (82%)	-	-	-	-

\* pretreatment score from Roland-Morris Disability Questionnaire for McKenzie group = 13; manipulation group = 13

\*\* pretreatment score from back and leg pain questionnaire for McKenzie group = 30; manipulation group = 29

### Study Critique:

Strengths of Peterson et al. include strong study design with the use of a randomized control therapists and chiropractors who strongly believed in the treatments they were performing. It was ensured both groups received the same amount of contact to decrease attention bias. Another positive highlight of the study was the main outcome: number of patients with treatment success. The researchers wanted clinicians to provide patients a specific outcome of treatment. The study included thorough tables and flow diagrams as a great representation of data.

There were several limitations to the study. First, the lack of a non-treatment control group is a disadvantage of this study as a comparison of each treatment group to a control is not possible. Secondly, this study was limited due to a high withdrawal rate during intervention, with researchers attributing it to a lack of treatment effect. The researchers made the assumption the

McKenzie group was preferred for their patient sample as 43 of the manipulation group withdrew from the study versus 28 in the McKenzie group. Due to withdrawal rates the study was underpowered increasing the possibility of type two error. Lastly, there was no standardization in regards to patient education of stabilizing and strengthening exercises to be completed by participants in their homes.

## Study #2

*The Effectiveness Of The McKenzie Method In Addition To First-Line Care For Acute Low Back Pain: A Randomized Controlled Trial*<sup>9</sup>

### Objective:

A randomized control trial evaluating the short-term effectiveness of adding the McKenzie Method of treatment in patients with acute LBP in addition to first line care of advice, reassurance, and simple analgesics in a primary care setting.

### Study Design:

The study was a multicentered, randomized control trial focusing on patients presenting with acute nonspecific LBP to primary care physicians. The study was conducted from September 2005 to June 2008. For the purpose of this study, new acute onset LBP is defined as occurring below the 12th rib and above the buttock crease with or without leg pain.

Screening of patients was conducted by thirty-one primary care physicians practicing in 27 clinics throughout Sydney, Australia. Screening occurred between September 2005 and December 2007. Inclusion and exclusion criteria are outlined in Table 3.

Table 3. Subject Inclusion and Exclusion Criteria; *Machado et al 2010*

<b>Inclusion Criteria</b>
18-80 years of age Present with new episode of acute non-specific back pain Able and willing to visit with one of the trial physical therapists for McKenzie Method treatment within 48 hours of presentation to primary care physician Six weeks of duration of back pain At least one month without LBP in which the patient did not consult a healthcare provider
<b>Exclusion Criteria</b>
Nerve root compromise "Red Flags" (infection, fracture, cancer) Spinal Surgery in the past 6 months Pregnancy Severe cardiovascular or metabolic disease Inability to read and understand English

LBP- low back pain

Computer generated randomization was carried out by a statistician not participating in recruitment, data collection, or treatment of patients. Patients were randomized into a first-line care group alone or a McKenzie group (receiving both first-line care and McKenzie treatment). It was not possible to blind both participants or providers as both were aware of what treatment they were receiving.

Patients received either intervention for three weeks. Patients were asked not to pursue other treatment options other than those available during the trial. First line care entailed advice (remain active and avoid bed rest), reassurance (acute LBP typically resolves quickly), and simple analgesics (acetaminophen). McKenzie Method consisted of referring patients to a physical therapist within 48 hours of initial appointment with primary care physician. Treatment in this group conducted by 15 physical therapist who had at least a 100 hours of postgraduate training and were credential as McKenzie therapists. Patients were then classified into one of the three McKenzie syndromes (derangement, dysfunction, or postural) and an individualized treatment plans were developed based on their condition. Patients received a maximum of 6 sessions over 3 weeks. Additionally, patients were asked to perform exercises at home in addition to their sessions with the physical therapist.

Short-term treatment effects were the main focus of the study as the McKenzie Method focuses on rapid relief of symptoms in LBP. Outcome of treatment was divided into primary and secondary measures. Measures were based on self-assessment by patient.

Primary outcome measures: pain at 1 week, based on the average of pain over the first seven days, and pain at 3 weeks. Pain was measured on numeric rating scale 1-10, and scores were provided based on a 24 hour average. The other measurement of the study focused on global perceived effect at 3 weeks and placed on a scale from -5 to 5 scale with -5 being 'vastly worse' and 5 being 'completely recovered.'

Secondary outcome measures: perceived disability at 1 and 3 weeks using a Roland Morris Disability Questionnaire, function at 1 and 3 weeks using a Patient Specific Functional Scale, global perceived effect at week 1 (same as the global perceived effect at week 3 in primary outcome measures), and follow-up at 3 months. Follow-up consisted of questioning participants if they were free from any LBP in the past 3 months with a 'no' indicating persistent LBP.

### Study Results:

260 consecutive patients were screened for eligibility and 148 met initial criteria outlined in table 3. 148 were then randomized into two groups, first-line care alone and first-line care and McKenzie method. Each group had one patient who was misdiagnosed and subsequently removed from the study. In total 73 patients were assigned to first-line care alone and 73 patients were assigned to first-line care and MDT. 68 patients from first-line only and 70 patients from first-line group and McKenzie group completed follow-up assessment at 3 months.

The patients in the McKenzie group were classified either as having derangement syndrome (94%) or dysfunction syndrome (6%). 93% percent of participants in the McKenzie group were prescribed lumbar rolls. Patients received a median of four sessions, ranging from 1 to 6 with a physical therapist over a 3 week period, and median of two sessions, ranging from 1 to 3 in the first week. At any time during the course of the study the maximum amount of patients lost to follow up was 8.

Patients who received both first-line care and MDT had a statistically significant change in pain but it did not meet the pre-established level for clinical importance which was 1 pain unit (on a scale of 1-10) difference between the two treatment groups. Outcomes are outlined in Table 4. Additionally, 37 patients in the McKenzie Group and 32 in the first-line care group went on to develop persistent lower back pain. The only significant finding was patients in the McKenzie group were less likely to seek additional medical care for their LBP after 3 weeks with 5 patients in the McKenzie group compared to 18 in the first-Line care group. These patients who sought out additional care after 3 weeks utilized physical therapy (32%), NSAIDs (18%), and acupuncture (14%).

Table 4. Mean outcomes in treatment groups and effects of the addition of MDT to first-line care; Machado et al 2010

Outcome	Participants (McKenzie/ First-line care only)	Unadjusted mean outcome (SE)		Adjusted mean outcome (SE)		Treatment effect (95% CI)*	P value
		McKenzie	First-line care	McKenzie	First-line care		
Pain - numerical pain scale 0 (no pain) to 10 (worst pain possible)							0.02
<i>1 week</i>	70/69	3.5 (0.3)	3.7 (0.3)	3.6 (0.2)	4.0 (0.2)	-0.4 (-0.8 to -0.1)	
<i>3 weeks</i>	70/68	2.0 (0.2)	2.3 (0.3)	1.8 (0.2)	2.5 (0.2)	-0.7 (-1.2 to -0.1)	
<i>Mean pain over first 7 days</i>	70/69	4.9 (0.2)	4.9 (0.2)	4.7 (0.2)	5.0 (0.2)	-0.3 (-0.5 to -0.0)	
Global perceived effect - scale from -5 (much worse) to 5 (completely recovered)							
<i>1 week</i>	70/68	2.6 (0.2)	2.1 (0.2)	2.6 (0.2)	2.1 (0.2)	0.5 (-0.0 to 1.1)	0.07
<i>3 weeks</i>	70/69	3.6 (0.1)	3.3 (0.2)	3.6 (0.1)	3.3 (0.2)	0.3 (-0.3 to 0.8)	0.33
Disability - Roland-Morris Disability Questionnaire 0 (no disability) to 24 (high disability)							0.74
<i>1 week</i>	70/68	8.4 (0.7)	9.0 (0.8)	8.0 (0.5)	8.2 (0.5)	-0.2 (-1.5 to 1.0)	
<i>3 weeks</i>	70/69	4.6 (0.7)	4.5 (0.7)	4.8 (0.7)	5.1 (0.7)	-0.3 (-2.3 to 1.6)	
Function							0.90
<i>1 week</i>	70/68	6.2 (0.3)	5.8 (0.3)	6.2 (0.2)	6.2 (0.2)	0.0 (-0.4 to 0.5)	
<i>3 weeks</i>	70/69	7.9 (0.2)	7.7 (0.3)	7.8 (0.2)	7.7 (0.3)	0.0 (-0.7 to 0.8)	

\*Treatment effects are model-based adjusted differences in outcomes between groups. Global perceived effect, was only measured at two time points after randomization, adjusted means and treatment effects are the same as unadjusted means and treatment effects. Effectiveness of the MDT is indicated by negative effects for pain and disability and positive effects of global perceived effect and function.

(SE) - Standard Error

Primary outcomes are in italics.

CI - Confidence interval

### Study Critique:

When approaching the treatment of acute LBP this study has several strengths. First, the study is a randomized control trial allowing for a direct comparison between MDT and the standard treatment modality of acute LBP in the primary care setting. Second, the study has high percentage of patients completing follow up assessment. Third, the physical therapists who administered treatment had additional training in MDT to ensure proper patient assessment, treatment, and education. Finally, the study had a narrow focus: acute LBP pain and did applying

MDT result in better patient outcomes when compared to a first-line care (advice, reassurance, and simple analgesics).

There is the issue of response bias, where the patient may give a favorable response to MDT because they are receiving an additional treatment or believe the researcher wants a positive outcome. Additionally, this was not a blinded study, with participants and researcher aware of what intervention was used. This creates the possibility of both observer bias, where the providers may focus on positive results, and subject bias, with participants provide responses they believe the researcher wants. Another issue regarding the study, was one of the authors at the time of the trial and research was the Director of Education for the McKenzie Institute International.

Another issue of the study is the small sample size, with only 146 participants, a larger population could detect a better clinical significance between MDT and first-line care. By having a larger sample size this would help to reduce a Type II error in the study, that the McKenzie Method does in fact cause a greater reduction in pain than just First-line treatment. Additionally, as referenced in Table 5 only the outcome of "pain" had a  $p$  value  $<0.05$  indicating there is weak evidence of MDT benefiting in the areas of global perceived effect, disability, and function.

### Study #3

*Orthopaedic Manual Therapy, McKenzie Method or Advice Only For Low Back Pain In Working Adults: A Randomized Controlled Trial With One Year Follow-Up*<sup>10</sup>

#### Objective:

A randomized control trial comparing the effects of two manual therapies and one advice only counseling session with treatment of low back.

#### Study Design:

Patients with acute or chronic LBP presenting to four occupational health care centers in Jyväskylä, Finland were recruited for the study. Inclusion and exclusion criteria is referenced in Table 5. Patients underwent physical assessment with a structured examination performed by the research assistant prior to randomization. Randomization was completed with sealed envelopes leaving 60 people per treatment group.

Table 5. Subject Inclusion and Exclusion Criteria; *Paatelma et al 2008*

<b>Inclusion Criteria</b>
18-65 year of age Employed Current non-specific LBP with or without radiating pain to one or both lower legs Acute or chronic LBP First or recurrent LBP
<b>Exclusion Criteria</b>
Pregnancy Low back surgery less than two months previously Red flags indicating serious spinal pathology

LBP- low back pain

The orthopedic manual therapy (OMT) group underwent spinal manipulation with different mobilizations. Patients were taught to perform stretching exercises to be completed at home once a day. The McKenzie method group patients were given an educational booklet and therapy exercise instructions to be repeated several times a day. High velocity, low force manipulation was avoided. Participants of the advice only group received 45-60 minutes counseling from a physiotherapist. Counseling discussion included pain tolerance, medication, early return to work and the good prognosis of LBP. Participants were instructed to maintain their physical activity and avoid bed rest.

The advice only group had one visit, while the two manual groups had a mean of 6 treatment sessions, ranging from 3-7. All patients were treated by the same therapist at each return treatment visit. The OMT group had manipulations carried out by a 20 year experienced physiotherapist. The McKenzie group was led by a 10 year experience physiotherapist trained in MDT. The advice only group was advised by physiotherapist with 5 years of clinical experience in treating LBP patients.

The two main outcomes measured in this study were intensity of leg and LBP and disability. Patients used a visual analogue scale to rate LBP from 0 (no pain or symptoms) to 100 (worst imaginable pain or symptoms). Disability in daily activities was measured using the RMDQ in relation to LBP. Progress was assessed at 3, 6, and 12 month follow-ups. The data was analyzed with intention to treat with *post hoc* comparisons between groups. This analysis allows researchers to see how effective the treatment would be within the clinical practice. Statistical significance was determined by a probability value < 0.05.

Study Results:

Over the course of the study, 44 patients were lost to follow-up for reasons including low back surgery, unwillingness to participate and being unreachable. This left 45 participants in the OMT group, 52 participants in the McKenzie group and 37 participants in the advice-only group. No significant differences existed between groups at baseline in age, gender, or characteristics.

At the 3 month follow-up, improvement in LBP and a reduction score on the RMDQ was seen in all three groups. However, there was no statistical difference between the groups. At the 6 month follow-up, the McKenzie group showed improvements in LBP ( $p=0.009$ ) and a lower disability index ( $p=0.003$ ) as compared to the advice only group. At the 12 month follow-up, both the OMT and McKenzie group showed an improvement on the disability index with respective p-values of 0.068 and 0.028 respectively. No statistically significant differences were found between the OMT group and the McKenzie group in pain or disability index at any point in the study. Outcome measures can be referenced in Table 6.

Table 6. Study outcome measures at baseline, 3, 6, and 12 month follow-up visits; *Paatelma et al 2008*

		OMT (n=45)	McKenzie (n=52)	Advice Only (n=37)
Baseline	Low back pain, VAS*	35	32	37
	RMDQ, 0-24**	9	9	8
3 months	Low back pain, VAS*	18	10	17
	RMDQ, 0-24**	2	1	0
6 months	Low back pain, VAS*	14	10	22
	RMDQ, 0-24**	1	0	1
12 months	Low back pain, VAS*	11	8	16
	RMDQ, 0-24**	0	1	0

\*self reported measures a VAS 0 (no pain) to 100 (worse pain)

\*\*0-24 point scale on Roland-Morris Disability questionnaire

OMT: orthopaedic manual therapy; VAS: visual analogue scale; RMDQ: Roland-Morris Disability Questionnaire

### Study Critique:



The study was strengthened with use of a randomized control trial and with the use of experienced therapists with over 10 and 20 years of practice. Results are able to be generalized due to routine referral of patients from occupational services and the commonly delivered treatments seen in the general public. However, this study had several problems that raise concern for validity of results.

One significant limitation of the study was a large dropout rate, with the highest dropout rates among the advice-only group, which acted as the control. This leads to an underpowered study which increases risk of type 2 error (failure to reject a false null hypothesis) due to the small sample size of n=136 patients. Based on the small sample size, the study was unable to differentiate groups into acute, subacute and chronic symptoms of LBP. Also, the treatment groups were treated differently with regards to treatment visits which can lead to biased results. Researching the different durations of LBP would be a beneficial addition in future studies as treatment modalities and symptom management may vary.

## **DISCUSSION**

The purpose of this review is to determine whether adults with LBP for any duration benefit from the McKenzie Method exercise program when compared to other treatments of LBP including spinal manipulation, simple analgesics, rest and reassurance, and patient education. The review focuses on outcomes addressing reduction in pain, disability, and improvement in function. An overview of the three studies is provided (Table 7).

All of the above studies demonstrated statistical significance when comparing MDT to either spinal-manipulation or first-line care in addressing LBP. All studies utilized the same measuring system for disability with the RMDQ. However, the Peterson et al. used a modified RMDQ scale which made assessment of results somewhat difficult to compare. Machado et al. and Paatelma et al. studies are similar to each other as both studies used MDT and first-line care or advice only counseling, near equal sample populations, and had follow up at three months. Additionally, Machado et al. demonstrated patients were less likely to seek additional care for their condition when using MDT. Peterson et al. demonstrates the benefit of MDT over spinal manipulation in addressing disability associated with LBP. Although, not a primary outcome in Peterson et. al and Machado et al., global perceived effect illustrated patients believing their condition was improving more with MDT than compared to the other interventions.

Overall when comparing these studies, study 2 Machado et al. presented the strongest evidence regarding the validity of the McKenzie Method as a treatment to LBP compared to other modalities. This is based on low drop-out rates, utilization of a control group receiving standard of care. Study 1, Peterson et al. failed to demonstrate the effectiveness of MDT based on not having a non-treatment control group, a high withdrawal rate, and failure to standardize patient education information. Study 3, Paatelma et al. results are unreliable due to being underpowered and having a significant drop out rate.

Although these studies were all conducted outside the US, they do have some usefulness. Lower back pain is prevalent throughout the world and is one of leading causes of disability in the US. These studies provide evidence of what treatment modalities work best for treating lower back pain regardless location. The one issue that may arise is all studies were conducted in countries with some form universal healthcare with which the US does not utilize. It would be beneficial to replicate these studies in the US to see if results are different.

Table 7. Overview of studies

	<b>Study #1</b> Peterson et al.	<b>Study #2</b> Machado et al.	<b>Study #3</b> Paatelma et al.
<b>Objective</b>	Randomized control trial comparing the effects of the McKenzie method to spinal manipulation in patients with greater than 6 weeks of LBP in conjunction with clinical advice and information.	Randomized control trial evaluating the short-term effectiveness of adding the McKenzie Method of treatment in patients with acute LBP in addition to first line care of advice, reassurance, and simple analgesics in a primary care setting.	Randomized control trial comparing the effects of two manual therapies and one advice only counseling session with treatment of LBP.
<b>Sample Size</b>	n=259	n=138	n=136
<b>Patient Gender</b>	Males and females	Males and females	Males and females
<b>Patient Age (years)</b>	18-60	18-80	18-65
<b>Follow-up Periods</b>	- Post-treatment - 2 month - 12 month	- 1 week - 3 week - 3 month	- 3 month - 6 month - 12 month
<b>Pain<sup>o</sup></b>	12 months <sup>*</sup> : MDT - 15.0 Manipulation - 12.2	3 weeks <sup>**</sup> : MDT - 2.0 First Line - 2.3	12 months <sup>***</sup> MDT - 0.8 OMT - 1.1 Advice Only - 1.6
<b>Global Perceived Effect<sup>o</sup></b>	At post-treatment <sup>¶</sup> : MDT - 48% Manipulation - 35%	3 weeks <sup>†</sup> : MDT - 3.6 First line - 3.3	Did not measure
<b>Disability<sup>o</sup></b>	12 months <sup>‡</sup> : MDT had 1.5 reduction greater than Manipulation	3 Weeks <sup>§</sup> : MDT - 4.8 First Line - 5.1	12 month <sup>§</sup> : MDT - 1 OMT - 0 Advice - 0
<b>Conclusion</b>	The McKenzie group showed more improvement in disability at the 2 and 12 month follow-up. The McKenzie group also reported more success with treatment at the 2 month follow-up compared to the manipulation group.	Statistical difference between McKenzie method and first-line care, but no appreciable difference between either groups. Participants receiving McKenzie Method were less likely to seek additional treatment compared to first-line care.	No statistically significant difference between OMT and McKenzie method at any follow up but slight treatment improvement compared to advice-only group.
<b>Limitations</b>	- High dropout rate - No non-treatment control group - No standardization or patient education	- Small sample size - Only focused on acute problem	- Small sample size - Significant dropout rate

<sup>o</sup> Pain, Global Perceived Effect, and Disability measurements taken from final outcome by date

\* Numerical pain scale 0 (no pain) to 60 (worst pain possible)

\*\* Numerical pain scale 0 (no pain) to 10 (worst pain possible)

\*\*\* Pain - self reported measures a VAS (visual analog score) 0 (no pain) to 100 (worst pain)

¶ Global perceived effect - based on number of patients with no global effect/total number of patients in study

† Global perceived effect - scale from -5 (much worse) to 5 (completely recovered)

‡ - Modified -Roland Disability Questionnaire

§ - Roland-Morris Disability Questionnaire 0 (no disability) to 24 (high disability)

LBP: low back pain; OMT: orthopedic manual therapy; MDT: McKenzie Method

## **CONCLUSION**

LBP is a common complaint practitioners will encounter in a variety settings. Clinicians are not only required to properly diagnose LBP but also need to understand all treatments available. Utilizing less invasive treatments such as MDT help to limit surgical or pharmacotherapy approaches. Additionally, the need to find alternatives to opiates in the treatment of LBP, and pain general has only increased in importance.

This review demonstrated some benefit of implementing MDT as opposed to first line care or advice/reassurance only. Patients perceived better function, decreased both pain and disability when utilizing MDT. While statistical significance was present in some outcomes, the clinical significance was found to be low. One benefit, illustrated in two of the studies, is patient's perception of their LBP improving with MDT as demonstrated by global perceived effect. In most instances, acute episode of LBP will self-resolve with or without an intervention.

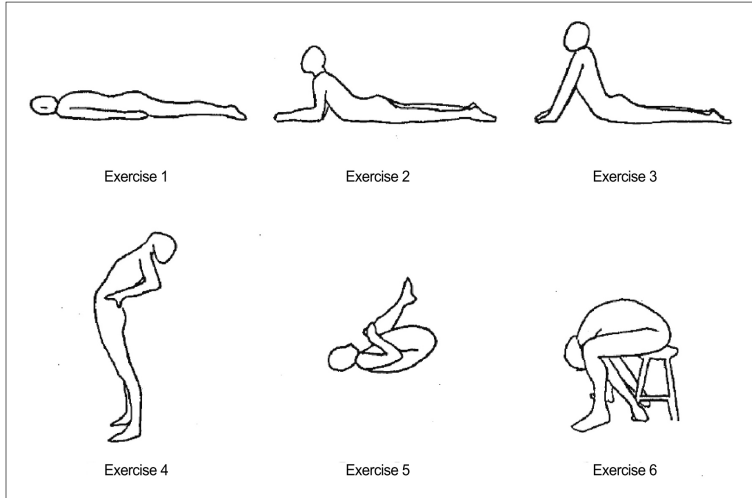
Preventing the development of acute LBP into chronic LBP warrants further study. All of the studies were limited in sample size and one year follow-up. Additionally, the studies were conducted outside of the US and MDT may yield appreciable results that are not evident in the locations where the studies were conducted. Further review is warranted to measure both long term outcomes (greater than 1 year) of LBP with MDT intervention and utilizing studies with a more uniformed methodology of conducting research. Although there is no clinical significance, MDT can still be utilized in certain patient populations. MDT is a good recommendation for proactive patients with mechanical LBP as they are able to actively engage in their recovery process.

## **ACKNOWLEDGMENTS**

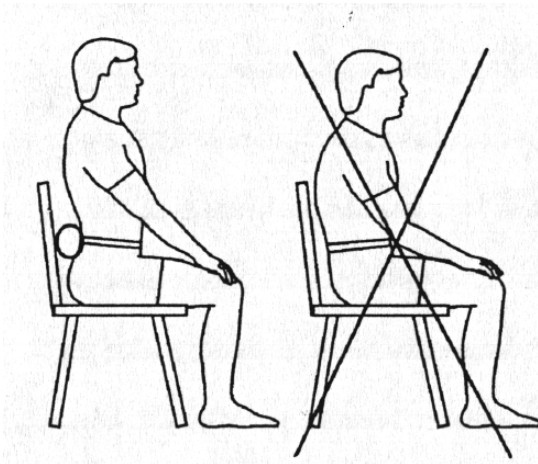
The authors would like to thank Dr. Erika Kancler, Carolyn Schubert, and the JMU Communication Center for their assistance in the writing of this project.

## APPENDIX 1

### Exercises for Dysfunction and Derangement Syndrome <sup>11</sup>



### Exercises for Postural Syndrome <sup>12</sup>



## REFERENCES

1. Rubin DI. Epidemiology and Risk Factors for Spine Pain. *Neurologic Clinics*. 2007;25(2):353-371. doi:10.1016/j.ncl.2007.01.004.
2. Kerry H. Levin, M D. Low back pain. Cleveland Clinic Web site. <http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/neurology/low-back-pain/>. Accessed 10/12/, 2017.
3. The benefits of MDT. The McKenzie Institute International Web site. <http://www.mckenzieinstitute.org/clinicians/benefits-of-mdt/>. Accessed 10/23/, 2017.
4. McKenzie method of MDT. The McKenzie Institute International Web site. <http://www.mckenzieinstitute.org/clinicians/information-for-healthcare-providers/>. Accessed 10/23/, 2017.
5. The McKenzie method - an overview. The McKenzie Institute International Web site. <http://www.mckenzieinstitute.org/clinicians/mckenzie-method/>. Accessed 10/23/, 2017.
6. Volkow N, McLellan AT. Opioid Abuse in Chronic Pain - Misconceptions and Mitigation Strategies — NEJM. *New England Journal of Medicine*.
7. Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement*. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed1000097
8. Petersen T, Larsen K, Nordsteen J, Olsen S, Fournier G, Jacobsen S. The McKenzie method compared with manipulation when used adjunctive to information and advice in low back pain patients presenting with centralization or peripheralization: A randomized controlled trial. *Spine*. 2011;36(24):1999. <http://www.ncbi.nlm.nih.gov/pubmed/21358492>. doi: 10.1097/BRS.0b013e318201ee8e.
9. Luciana AC Machado, Chris G Maher, Rob D Herbert, Helen Clare, James H McAuley. The effectiveness of the McKenzie method in addition to first-line care for acute low back pain: A randomized controlled trial. *BMC Medicine*. 2010;8(1):10. <http://www.ncbi.nlm.nih.gov/pubmed/20102596>. doi: 10.1186/1741-7015-8-10.
10. Paatelma M, Kilpikoski S, Simonen R, Heinonen A, Alen M, Videman T. Orthopaedic manual therapy, McKenzie method or advice only for low back pain in working adults: A randomized controlled trial with one year follow-up. *Journal of Rehabilitation Medicine*. 2008;40(10):858-863. <http://www.ingentaconnect.com/content/mjrl/sreh/2008/00000040/00000010/art00012>. doi: 10.2340/16501977-0262.
11. Thomas E. Dreisinger P. Pain relief from McKenzie method. Spine Health Web-site. <https://www.linkedin.com/pulse/have-your-heard-mckenzie-method-low-back-pain-dr-calvin-cheung>. Updated 2007. Accessed 11/28/, 2017.
12. Nick Rinard MPT, Cert MDT. Nick Rinard Physical Therapy. <http://rinardpt.com/author/nrinard/>. Updated 2013. Accessed November 29, 2017.