

The cognitive-behavioral aspects of the Mulligan concept of manual therapy: A systematic review

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Abstract

Low back pain (LBP) is a common clinical problem imposing a prominent socio-economic burden. The purpose of this systematic review was to investigate the biopsychosocial effects of the Mulligan Concept (MC) of manual therapy (MT) when applied to patients with LBP. Three researchers independently evaluated the literature quality, and completed a review on five online databases (Medline, Cochrane Library, Science Direct, ProQuest and Google Scholar) for articles published from January 1st 2010 to November 20th 2021, using a combination of free words, Wildcards and Medical Subject Headings (MESH) terms: "Mulligan mobilization" AND "back pain" OR "SNAGs." In total, 62 studies were selected for full-text reading, from which finally 6 studies were included in the present review. The results revealed that the studies where the MC of MT was applied to treat LBP mainly lacked concern regarding the effect that the intervention has on the cognitive and behavioural parameters. The ones that introduced measure outcomes for at least some parts of the cognitive behavioural components, showed that the MC has a positive effect, even though without a long-term follow-up assessment. This review summarized that the evidence of the MC on cognitive behavioural (CB) aspects of patients with LBP is controversial and scarce.

Key Words: Mulligan concept; sustained natural apophyseal glides (SNAGs); low back pain; cognitive behavioral treatment.

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Low back pain (LBP) is a common clinical problem and the first cause of disability in the elderly, imposing a prominent socio-economic burden.^{1,2} Some of the applied interventions are focused on improvement of LBP management, and particularly on improving patients' self-management skills, restricting falsely widespread beliefs on LBP among both the population and health care professionals, contradicting the seeking of a "cure", redesigning clinical pathways and stop using harmful treatments or unsupported evidence-based tests. Manual therapy (MT) techniques are a common approach in the field of physiotherapy for managing spinal conditions since many years.³ The Mulligan Concept (MC) of MT is a relatively new concept. It utilizes pain-free low-velocity joint mobilization techniques that can

include an active movement component.⁴ Specifically for the lumbar spine, the MC uses sustained natural apophyseal glides (SNAGs), spinal mobilization with leg movement (SMWLM), along with several techniques called the gate technique, traction straight leg raise (SLR), and the bent leg raise technique.⁵ About 2.4 thousand British physiotherapists (PT's) use this techniques and about half of them on a daily or weekly basis.⁶ In America, certified Mulligan practitioners - who are mainly PT's specialized in that method - largely apply the concept's techniques for the lumbar spine (over 94% of the time) and mostly in conjunction with other techniques, such as Maitland's, myofascial release and manipulation.⁷ According to the concept, the faulty position of a joint can be the reason for movement loss and/or pain, and, once corrected through a manual

repositioning of the joint's surfaces, pain can significantly subside, many times even after a single session.⁴ Especially with regards to LBP, it is fathomed that a reason for LBP could be the 'excessive wedging' of the facet joints and that this abnormal pattern of movement, stresses the disc which is internally disrupted, weakened and fissured, thus leading to and preserving LBP. However, evidence highlights that several different factors can trigger LBP, specifically chronic LBP (CLBP).⁷ Moreover, there is a group of patients the reason for CLBP is predominantly of psycho-social nature, where the patients respond mal-adaptively to pain. In fact, the biggest category of CLBP patients includes those with movement or control impairments that were mainly mechanical in nature, but elicited a maladaptive physical compensation, at first, and, secondly, a maladaptive cognitive compensation. Lately, plenty of studies were published that strongly suggested the beneficial effect that cognitive-behavioral treatment (CBT) approaches have on managing CLBP.⁸⁻¹¹ Meticulously enough, mere wording itself has the ability to affect clinical outcomes either negatively or positively in musculoskeletal rehabilitation.¹² Still, no clear CBT pattern exists for LBP patients. From the MT point of view, late studies on general applications of the MC, including LBP, support the efficacy of the techniques.^{13,14} On the contrary, the most recent review on the effectiveness of the MC specifically on LBP deemed it insufficient to strongly support its use, even though it had a positive effect, on range of motion, pain, and disability.¹⁵ It is noticeable that in these reviews, there was a lack of interest in the cognitive-behavioral (CB) aspects of LBP.

Thus, the purpose of this study was to search for the biopsychosocial effects that the MC of MT has on treating patients with LBP. In that regard, a structured literature review was created with systematic analysis and synthesis.

Materials and Methods

The present systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement for reporting systematic reviews.¹⁶ Relevant articles were identified by searching: Pubmed/Medline, Cochrane Library, Science Direct, ProQuest, and Google Scholar. The reason for selecting this search strategy and databases was based on the fact that it produced more results that could potentially respond to the research question. A combination of free words, Wildcards, and Medical Subject Headings (MESH) terms: " Mulligan mobilization " AND " back pain " OR " SNAGs" were used in the search strategy. Searches were supplemented by hand searching and retrieval of any additional articles meeting eligibility criteria that were cited in reference lists. The time period researched was from January 1st, 2010 till November 20th, 2021. This was because the biopsychosocial aspects of LBP were mostly researched

within the last decade, according to the pilot study. However, older studies, screened from the reference lists of those included, that were of appropriate quality and answer the research question, were also included. The quality evaluation of the included literature to determine the inclusion and exclusion criteria using the 2015 updated Cochrane Back and Neck Review Group 13-item criteria.^{17,18} Data extraction from the included studies was performed independently by three non-blinded researchers (D.A., J.P., and Y.D.) using a standardized data extraction form. The extracted data presented in Table 1 included the first author's name, year of publication, the parameters of intervention, the biopsychological aspects studied, as well as the follow-up and it's efficacy across study outcomes. In case of disagreement, the evidence-based team composed of physical and rehabilitation medicine (PRM) physicians and experts in orthopedics and traumatology shall decide to include or eliminate the research. After the evidence was extracted, another researcher carefully checked it again to ensure the accuracy of the data. The search strategy considered the components of the Population, Interventions, Comparators, Outcomes, and Study design (PICOS) tool.¹⁹ In order to avoid the usual criticism of reviews with systematic approach, it must be stated that the aforementioned criteria, along with the search strategy and search terms, were determined a priori.²⁰ Inclusion criteria were as follows: (a) reviews and randomized control trials, (b) studies only in adults over 18 years of age with LBP or CLBP, radiating or non-radiating, (c) clinicians used the MC for treatment of either LBP or CLBP, (d) the comparison was made between the MC alone or combined with conventional therapy against control group, sham SNAGs, placebo treatment, motor control/motor learning interventions, exercises, other forms of MT or classical physiotherapy; (e) the research outcome was, either primarily or secondarily, focusing on CB parameters including fear-avoidance/kinesiophobia, depression/anxiety, anger, catastrophizing, patient's believes and thoughts, social and emotional facets of disability, overall physical function and quality of life. Exclusion criteria include the following: (a) pilot studies, case studies, case series, and dissertation theses. (b) research on subjects under the age of 18, asymptomatic humans, patients with cancer, spine fracture, had surgical interventions, neurological diseases, myopathies, pregnancy-related LBP; (c) the research intervention was focused on areas of the body other than the lumbar spine or the intervention was any other treatment approach; (d) studies outside the research subject, such surgical interventions, conditions other than LBP, etc., (e) studies focusing only on pain or range of motion or stiffness or dynamic balance or muscular endurance or hamstring flexibility and generally anything other than the biopsychosocial perspectives of LBP, and (f) studies that were not published (grey literature) for reasons of quality, (g) studies with less than 8/13 item criteria¹⁷⁻¹⁸ and studies which did not endorse the

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CONSORT statement as it is an indicator of reporting bias for clinical trials in the medical research field,²¹⁻³⁰ and (h) data not written in English.

Results

The search strategy from four databases revealed 973 studies. Of these, 17 were rejected as duplicates and 13

Table 1. Methodological characteristics of the systematized studies.

First author (year)	Intervention	Parameters of Intervention	Biopsychological aspects studied (assessment tools)	Follow-up	Is it effective?	Score
Bello et al. ²³ (2019)	PINS + exercises (n=20) Vs SMWLM + exercises (n=20)	Regarding PINS -> 30" pressure; Regarding SMWLM -> 30" for 3 reps at first and 6 reps later on. Total duration of experiment: 2sessions/week for 8 weeks.	Disability (RMDQ), quality of life (SF-36), perception of recovery (GROC).	Assessments before, at week 4 and week 8.	No	62% (8/13)
Ali et al. ²⁴ (2019)	Maitland's PA glide mobilization + exercises (n=17) Vs SNAGs + exercises (n=16)	Regarding Maitland's -> 3 circles of 60' on hypomobile with 1' rest, early sessions with grade I, later on grade II and III; Regarding SNAGs -> 2 to 3 sets of 4-6 repetitions. Exercises of 2-3 sets of 10-15 reps with 30"-1' rest for both groups (30' total). Duration for both: 4Xweek, 4 weeks.	Disability (ODI).	Assessments before and at the end.	No	62% (8/13)
Satpute et al. ²⁵ (2018)	Conventional (neural mobilization + exercise +TENS) (n=30) Vs Conventional (same) + SMWLM (n=30)	6 sessions of 50' over 2 consecutive weeks for both + 5' of SMWLM for study group.	Disability (ODI), perception of recovery (GROC).	Assessments before, at the end, 3- and 6-months follow-up.	Yes, both short- and long-term.	77% (10/13)
Hussien et al. ²⁶ (2017)	Conventional (stretching + strengthening) (n=19) + SNAGs Vs Conventional (same) (n=23)	Regarding SNAGs 3sets/6 reps, 3Xweek; regarding conventional -> 3 X/week for both.	Disability (ODI).	Assessments before and at the end.	Yes. Both groups had significant improvement, but more for the SNAG group.	69% (9/13)
Ahmed et al. ²⁷ (2016)	Neural mobilization + conventional physiotherapy (hot packs, TENS, strengthening) (n=12) Vs Mulligan's SMWLM + conventional physiotherapy (same) (n=12)	3 days/week for 4 weeks.	Disability (MODI).	Assessments before and at the end.	Yes, per se, but less effective compared to neural mobilization.	62% (8/13)
Hidalgo et al. ³⁰ (2015)	Real SNAGs (n=16) Vs Sham SNAGs (n=16)	3 sets of 6 repetitions for each.	Disability (ODI), Kinesiophobia (Tampa scale).	Assessments conducted before and 2 weeks after the end.	Yes, for disability, No for kinesiophobia.	77% (10/13)

Abbreviations: MODI: Global Rating of Change scale, Modified Oswestry Disability Index, ODI: Oswestry Disability Index, PINS: progressive inhibition of neuromuscular structures, RMDQ: Roland-Morris Disability Questionnaire, SBI: Sciatica Bothersomeness Index, SF-36: Short-Form 36 Health Survey, SFI: Sciatica Frequency Index, SMWLM: spinal mobilization with limb movement, SNAG: sustained natural apophyseal glides, TENS: transcutaneous electrical nerve stimulation.

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as pilot studies, case studies, and case series. Of the remaining, 739 studies were rejected after reading titles and abstracts, based on inclusion/exclusion criteria. Additionally, 57 of the remaining studies were rejected after reading the abstract or full text, because they did not

focus on CB effects, scored lower than 8/13 on the item criteria, did not endorse the CONSORT statement or it was grey literature (e.g., dissertation thesis). To the remaining 5 studies, one more was added after screening the reference lists of reviews on the topic, adding up to 6

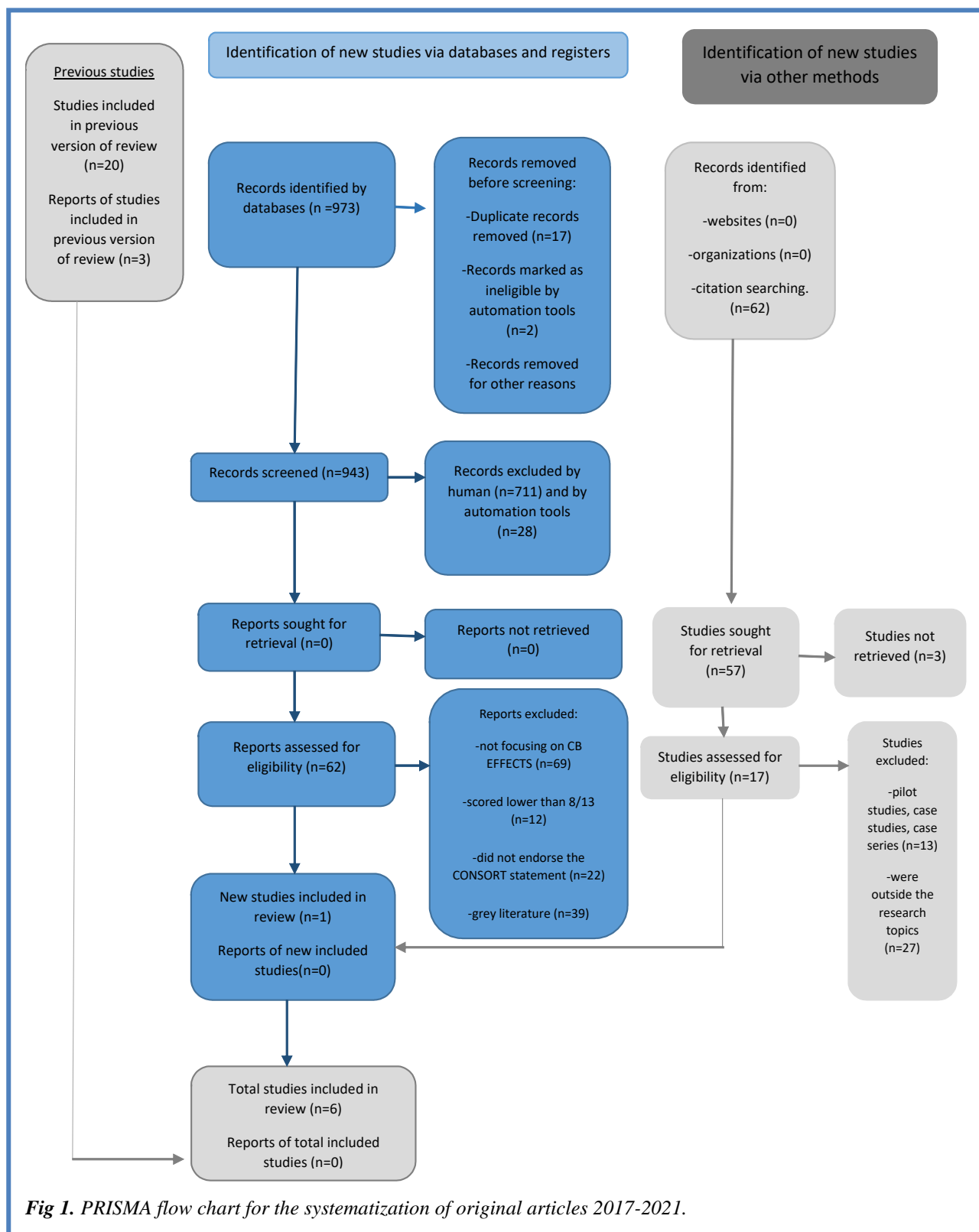


Fig 1. PRISMA flow chart for the systematization of original articles 2017-2021.

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Table 2. *Quality assessment of the reviews (Van Tulder et al., 2003).¹⁸*

Updated method guidelines for systematic reviews in the Cochrane Back Review Group

Strong evidence for effectiveness: consistently positive (significant) findings with high quality RCTs.	
Moderate evidence for effectiveness: consistently positive (significant) findings within multiple low-quality RCTs and/or one high quality RCT.	
Limited evidence for effectiveness: positive (significant) findings within one low quality RCT.	
Controversial evidence for effectiveness: provided by conflicting (significant) findings of the RCTs (<75% of the studies reported conflicted findings).	✓
No evidence found in favour of effectiveness of the intervention: RCT(s) available, but no (significant) differences between intervention and control groups were reported.	
No systematic review or RCT found.	

studies that fully covered the inclusion/exclusion criteria and were finally included in the review. PRISMA flow diagram presents an overview of the selection process (Figure 1).-In the six studies that were finally included, 231 patients participated in a therapeutic intervention to treat LBP. The Mulligan techniques used were the SNAGs^{24,26,28} and the spinal mobilization with limb movement (SMWLM).^{23,25,27} Moreover, three studies focus on patients with radiating pain,^{23,25,27} while three describe LBP as non-specific.^{24,26,28} Noteworthy, four studies^{23,24,26,28} focused on patients with chronic LBP, and two^{25,27} on subacute LBP. The significant effectiveness of the Mulligan's approach in every field of the CB aspects of LBP were shown in two studies,^{25,26} of which one was in the long-term.²⁵ Mulligan's techniques were administered thrice a week in three studies,²⁵⁻²⁷ four times a week for one stud,²⁴ twice a week for one study,²³ and one study performed only one single session.²⁸ Follow-up measurements were conducted for two studies.^{23,25} The most common assessment instrument used was the Oswestry Disability Index (ODI),²⁴⁻²⁸ the Global Rating of Change (GRoC) score was used in two studies,^{23,25} the 36-Item Short Form (SF-36) questionnaire was implemented in one study,²³ the Roland Morris Disability Questionnaire (RMDQ) was also used in one study,²³ while the Tampa scale was only used in one study.²⁸ Interestingly, three of the finally

included studies,^{24-25,27} were conducted in Asia, two in Africa,^{23,26} and one in Europe.²⁸

The result of the review shows that the Mulligan method is limitedly effective in treating at least some CB aspects of LBP. Regarding kinesiophobia, no evidence was found in favor of the technique. Regarding depression/anxiety, anger, catastrophizing, patient beliefs and thoughts, no systematic review or RCT was found. However, for the conclusion to be considered important, the quality of the review should be assessed. For this reason, the criteria of van Tulder et al.,¹⁸ which were created exclusively for systematic literature reviews of low back and cervical pain research, were selected. On the basis of these criteria, the evidence on the effectiveness of the Mulligan method studied in this review is proved to be controversial. The quality assessment of the reviews was conducted according to the method guidelines within the Cochrane Collaboration Back Review Group presented in the Table 2.

Discussion

To our knowledge, this is the first systematic review aimed to evaluate the biopsychosocial effects that the MC of MT has on treating patients with LBP. MC is a MT technique, which combines a sustained manual "gliding" force to a joint with concurrent physiologic (osteokinematic) motion of the joint, either actively performed by the patient or passively performed by the PT's.⁵ The results of this study have shown that the MC has a low positive effect on the CB aspects of LBP. The context of systematic analysis and synthesis was chosen as it is easier to fit together whatever is known at the present state about a topic.²⁹ Research has settled on the argument that LBP is a multidimensional issue that warrants a multidisciplinary approach.³⁰ MT techniques, as in many other interventions, trigger a placebo effect that can be capitalized by maximizing this response to reduce musculoskeletal pain.³¹ Besides, people believe that the main reason for their LBP is mainly of biomedical nature and, to a lesser extent, of biopsychosocial etiology.³² Noteworthy, there is a notion that people tend to relate their pain to humidity and weather conditions as it possibly affects mood and physical activity.³³ Identification of biopsychosocial factors, patient-centered communication, empowering of self-management, and embracing patient education to assist behavioral changes and convey evidence-based facts are some of the main actions that have to be taken for the management of pain, irrespective of the body area.³⁴ Research shows that, in the long-term, CB therapy has shown better results with regards to the CB parameters of LBP when compared to MT, though not regarding pain.³⁵ Adding neuroplasticity explanation during the employment of manual therapy techniques for LBP has shown some positive effects.³⁶ Lately, there has been a shift towards incorporating pain education and CB treatment approaches by PT's for the treatment of back pain.^{37,38} In this systematic review, the inclusion criteria

involve every field of the cognitive-behavioral and biopsychosocial parameters.

The reason for that was because CB responses are mostly an umbrella term that encompasses many variations and sub-entities such as sleep, stress, anxiety, fear-avoidance catastrophizing, anger, depression, life outlook, and physical conditioning.³⁹ On that given, many results were expected in such a broad category of included topics. Contrary to that, the research showed that there are not plenty of studies focusing on many of the aforementioned topics. Most of the finally included studies focused on disability and used ODI to assess it.⁴⁰

However, it lacks the ability to assess the social, emotional, and psychological aspects of disability,⁴¹ and it would have been better if used in combination with another assessment tool, like SF-36, in patients with LBP.⁴²

Given that ODI validly assesses several other factors of a person's life that involve biopsychosocial responses to LBP such as sleeping, social life, sex life, etc.,⁴³ it covered at least some part of the research question. Noteworthy, none of the studies which implemented ODI reported separately on each and every different focus area that the assessment tool covers. Instead, they offered tables that depicted mean values and mean differences which blurred the picture.

To elaborate, a possible improvement in sitting by two points and a decrease in sleeping by one would show that there was an overall improvement in ODI, overshadowing the biopsychosocial responses that LBP can trigger in a patient. Regarding the strengths of the current systematic review, it must be noted that this is the first review to ever examine the biopsychosocial effects that an MC intervention has on patients with LBP. Moreover, it must be noted that the methodology of this structured review establishes rigor as much as possible, in an effort to avoid common methodological drawbacks found in literature reviews. Lastly, the finally included studies were most highly relevant to answer the research question and of good quality, which is a result of the good methodological structure.

On the contrary, the first limitation of this systematic review was the total amount of studies, as more studies than the ones included were expected, given the broad topics researched. Secondly, the exclusion of grey literature and the fact that the review was computer-generated renders it possible that some studies might have been missed, but this is highly unlikely as the search was very broad and comprehensive to maximize the inclusion chances for the most relevant articles. Thirdly, there is a possibility for language bias due to the exclusion of articles whose full text was not in English. In conclusion, the evidence regarding the biopsychosocial effects of the MC's techniques for treating patients with LBP is still controversial and scarce. Further studies focused to the bio-psychosocial aspects of the MC will contribute to the evidence-base for MT management of patients with LBP and will lead to

improved clinical decision making of non-pharmacological treatment modalities of LBP.

List of acronyms

CB - Cognitive behavioural
CB - Cognitive behavioural treatment
CLBP - Chronic low back pain
FM - Fascial manipulation
GRoC - Global Rating of Change
LBP - Low back pain
MC - Mulligan Concept
MT - Manual Therapy
ODI - Oswestry Disability Index
PICOS - Population, Interventions, Comparators, Outcomes, and Study
PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PRM - Rphysical & rehabilitation Medicine
PT's - Physiotherapists
RMDQ - Roland Morris Disability Questionnaire
SF-36 - The 36-Item Short Form
SLR - Straight leg raise
SMWLM - Spinal mobilization with leg movement
SMWLM - Spinal mobilization with limb movement
SNAGs - Sustained natural apophyseal glides

Contributions of Author

DA, YD, KP, JP: designed the study and prepared the manuscript. YD, JK, VO, JP: collected the data. DA, YD, JK, VO, KP, JP: analyzed the data. All authors read and approved the final manuscript.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Ethical Publication Statement

The authors confirm that they have read the Journal's position on the issues involved in ethical publication and state that this report is consistent with those guidelines.

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