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Case Report

The movement potentiation scale and movement therapy – A study of three cases

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ABSTRACT

A study of three separate female volunteers was conducted. The movement potentiation scale™ (MPS) was used as a movement evaluation and pain levels were determined using a Visual Analog Scale (VAS) for pain. The six core movement challenges in the MPS evaluation have a combined point value of 26. After the evaluation, every subject underwent a consecutive five-day functional movement training program, which had an emphasis on movement quality, proprioception, balance, coordination, and optimal biomechanics under suitable stimuli. Provocative daily triggers were determined, and participants were educated on movement. Post-intervention data, including the repeated MPS and VAS pain rating findings, were gathered on the day six. Every participant showed a marked improvement in their MPS score and pain. On day one, participant 1, who was awaiting surgery for ongoing severe lower back pain, had a low MPS score of 5/26. On day six, following the intervention, she reported 0/10 discomfort and a 15/26 MPS score. Participant 2 began the trial with a low MPS score of 7/26, chronic shoulder pain, and paresthesia down her left arm. On day six, she reported 0/10 discomfort, no paresthesia, and an improved 14/26 MPS score. Participant 3 had an MPS score of 8/26; the predominant complaint was urinary incontinence. On day six, she showed an improved MPS score of 18/26, with a 10-day follow-up of nil urine incontinence.

Keywords: Athlete, Central nervous system, Fatigue, Movement potentiation scale, Movement therapy, Recovery, Sports science

INTRODUCTION

Around 65.8 million people in the US alone receive medical attention for musculoskeletal (MSK) injuries each year, accounting for 77% of all injury-related visits and contributing significantly to the global leading burden of disease.[1] Per year, treating MSK injuries costs $176.1 billion US dollars, with traditional methods of care such as pharmaceutical interventions, imaging, and/or surgery contributing significantly to this number.[1] Beyond the financial strain, the time burden MSK-related injuries can have on primary care personnel, medical doctors, general practitioners, and hospital emergency facilities is immense.[2,3] Effective and viable conservative treatment strategies that allied health-care professionals carry out should be explored. David Johnson (neurosurgeon) considers "Movement Dysfunction" (MD) the primary cause of MSK nociception and inflammation. Effective treatment of MD requires specific and distinctive movement therapy. In 2015, based upon this paradigm, he began delivering movement therapy, NeuroHAB™, coined to reflect its contrasting focus on qualitative neural control of the MSK system. NeuroHAB™ not

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only provides an industry-first definition for "Movement Proficiency" but also a training protocol that corrects MD.[4,5] This study looks to build upon the foundations laid by Johnson by utilizing a movement screening scale called "The Movement Potentiation Scale™" (MPS) [Table 1]. This movement screen covers the functional movements required to test the prerequisites for quality movement, such as stability, control, tissue integrity, muscular strength, and neural coordination. The MPS scores pre- and post-intervention were juxtaposed with pain scores, and the correlations were documented.

This case report aimed to explore the efficacy of MPS and movement therapy. Through the study of three separate MSK rehabilitation cases, observations of potential changes in pain and disability were investigated.

CASE REPORT

A case report of three female participants was conducted, each presenting with different primary complaints. The variability of symptoms was the deciding factor and inclusion criteria for selecting participants for this case series. Each participant provided a pre-intervention primary complaint and pain rating between 1 and 10 using the Visual Analog Scale (VAS) for pain, followed by a comprehensive history and MPS assessment. The six core movement challenges in the MPS model have a combined point value of 26. Three categories are set to determine between 0–15: Not yet competent, 15–20: Competent, and 20–26: Proficient movement. After the MPS evaluation, every subject underwent a consecutive five-day functional movement training program. With an emphasis on proprioception, balance, coordination, and optimal biomechanics under suitable stimuli and applied stress, this program emphasized movement quality over quantity. Daily activities and significant provocative movements were determined. All participants received education regarding safe movement techniques, postural stress, hip hinging, squats, overhead lifting, and bracing coordination. Each movement therapy class took $1^{1/2}$-2 h and consisted of 11 movement tasks broken down into two parts [Table 2]. Day six post-intervention data was gathered, including the findings of the repeated MPS assessment and a VAS pain rating [Figure 1]. The lead researcher and sports scientist with 20 years of training experience completed the assessment protocols, exercise movement training, and data collection. No ethical issues existed in this case series, and all participants gave informed consent.

Participant 1

A 66-year-old female with minimal exercise experience complained of recurrent and chronic low back pain (LBP). A thorough history was conducted, which revealed four different types of pain at the L4/L5 and S.I joint region:

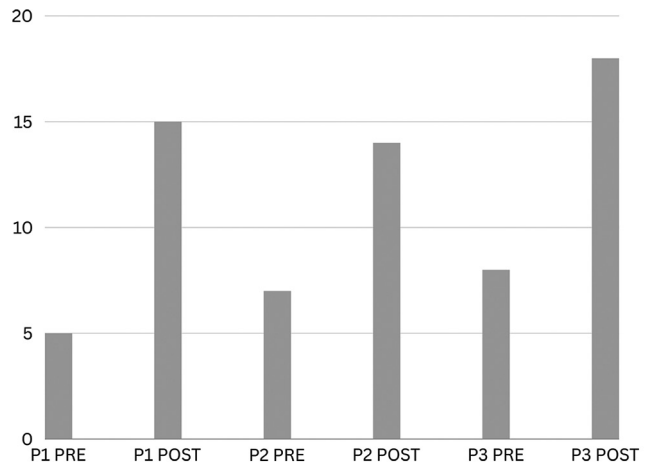

Figure 1: Movement potentiation scale score pre- and post-intervention. P: Patient.

1. L4/5 unilateral right-sided "catching" intense sharp pain
2. L5/S1 unilateral right-sided stiff sharp pain
3. L4/L5/S1 bilateral diffuse pressure and ache
4. A referred sharp pain at the anterior-lateral aspect of the right knee.

Pain levels varied throughout the day, with VAS scores of 3/10 at best and 9/10 at worst. Provocative testing presented flexion, extension, lateral flexion, compression, and load intolerances. Some body positions had a palliative effect, but not for long and never completely pain-free. The pain was present all day; however, the knee pain was worst in the morning, and the back pain was worst in the evening; the sharp "catching" pain would occur intermittently and seemingly unprovoked. Pharmaceutical options were exhausted, with very little success at managing or reducing pain. Quality of life was significantly altered, including sleep duration and quality. The participant had not been pain-free since 2019 and had sought treatment from numerous health-care providers before that time. The most recent meeting was with an orthopedic and spine surgeon, who discussed the possibility of using both anterior interbody cages and posterior pedicle screws (local bone and allograft) for fusion of the area. This surgical intervention was proposed as a result of imaging abnormalities in the L4/L5/S1 facet joints.

The pre-intervention VAS pain score was 3/10 at best, 6/10 on average, and 9/10 at worst. The pre-intervention MPS was 5/26 (Not yet competent).

Participant 2

A 34-year-old female presented with a primary complaint of left shoulder pain and a secondary complaint of LBP. A diffuse ache around the anterior-lateral shoulder region was noted, with occasional numbness and tingling down to

Table 1: Movement potentiation scale.

Movement potentiation screening form			
Movement	**Image**	**Screening criteria**	**Score**
Romberg's		O - None O - Normal stance (eyes open) O - Normal stance (eyes closed) O - Tandem stance (eyes open) O - Tandem stance (eyes closed)	/4
Active foot stabilisation (AFS)		O - None O - No in/eversion present O - 3 points of contact O - Very stable	/3
15" touch down		O - None O - Adequate AFS present O - Proper knee/hip alignment O - Controlled movement O - Highly stable	/4
Squat		O - None O - AFS present O - Adequate ankle mobility O - Frontal plane knee control O - Lateral hip stability O - Posterior chain activation O - Adequate Hip R.O.M O - Neutral lumbar spine control O - Stable and coordinated	/8
Hip hinge		O - None O - Posterior chain activation O - Hip centric rotation O - Neutral lumbar spine	/3
Kettlebell Bottom-up		O - None O - Active external rotation O - Active internal rotation O - Scapula control O - Stability + coordination	/4

0 - 15: Not yet competent | 15 - 20: competent | 20 - 26: proficient movement

Table 2: Prescribed exercise selection.

Part A	Part B
5 Minute Walk Prone	Calf Raises (3 x 10)
Push-Up (2 x 60 sec)	Kettle Bell Bottom Up (3 x 5-10)
Lock Big 3 (3 x 10)	Kettle Bell Squat (3 x 10)
McGill Big 3 (3 x 30 sec)	Asymmetrical Farmer
Frog Pose (1x 2 minute)	Carries (3 x 30m)
	Single Leg Touch Down (3 x 10)
	Hip Hinge (3 x 10)

the C6 dermatome/median distribution part of the hand and ring finger. Pain and stiffness were also noted from the right C5/6 cervical vertebra. The participant has had ongoing issues since injuring her neck/shoulder approximately 2-years-ago, where the mechanism of injury was overreaching. VAS scoring was documented at 2/10 at best and 8/10 at worst. Sleeping positions or daily activities can often exacerbate pain. Rest and anti-inflammatories help ease the pain. The LBP is diffuse and bilateral approximately around the posterior superior iliac spine area. Pain is better in the morning and gradually increases throughout the day with a VAS score of 5/10, but never worse than that. Provocative testing presented flexion and load intolerances, especially those positions if prolonged, i.e., sometimes poor posture standing and/or sleeping and/or sitting. The participant had minimal exercise experience.

The pre-intervention VAS pain score for the shoulder was 2/10 at best, 6/10 on average, and 8/10 at worst. The pre-intervention MPS was 7/26 (not yet competent).

Participant 3

A 32-year-old female presented with a primary complaint of urinary incontinence and a secondary complaint of general lack of balance and/or coordination. The participant started experiencing incontinence following the birth of her first and only child 4 years ago. Her general practitioner referred her to many physiotherapists, including postpartum specialists. However, their treatments were unsuccessful. Other therapies, such as general exercise and chiropractic care, were ineffective.

The pre-intervention VAS pain score was no pain. The pre-intervention MPS was 8/26 (Not yet competent).

RESULTS

Positive results were documented following a five-day movement therapy program intervention. The program itself lasted between 1 and 2 h daily, and rather than concentrating on general non-specific cardiovascular "traditional" exercise, it was designed to refine key movement qualities that are pre-requisites to healthy, proficient, and functional movement.

The program focused on and saw improvements in

1. Core engagement and coordination
2. Foot-to-floor stability and posterior chain-driven hip hinging
3. Full range of motion (ROM) controlled squats
4. Unilateral weighted torso-controlled walking drills
5. Single-leg triple flexion/extension
6. Coordination of the ankle, knee, and hips
7. Shoulder presses with optimal scapular humeral stability, rhythm, and control.

Every subject experienced a substantial decrease in pain and MPS score, indicating a general improvement in strength, endurance, mobility, spatial awareness, balance, and movement competency.

Participant 1

On day six, participant 1 reported having a 15/26 MPS score and 0/10 discomfort. She reported that she slept pain-free and experienced no agony "for the first time in years." Over the five-day intervention, participant 1 made exceptional advances in balance, coordination, and skill – she even scored full marks on the final hip hinge assessment. She was also able to successfully remove provocative daily activities and movements that were identified during the history and assessment; this allowed the downregulation of pain and the opportunity to build capacity for loaded functional movements. Movement strategies for daily activities were also prescribed and adhered to.

The post-intervention VAS pain score was 0/10 at best and 5/10 at worst. The post-intervention MPS was 15/26 (Competent).

Participant 2

On day six, participant 2 reported having no pain and an improved MPS score of 14/26. The left shoulder pain, radiating pain, and paresthesia down into the index finger and hand were also gone. She made exceptional advances in shoulder stability, coordination, and strength. It was also noted that she experienced fairly uncomfortable delayed-onset muscle soreness, which is to be expected.

The post-intervention VAS pain score was 0/10 at best and 4/10 at worst. The post-intervention MPS was 14/26 (Not yet competent).

Participant 3

On day six, participant 3 presented with an MPS score of 18/26. Her Romberg test was exceptionally better, showing improved balance and proprioception. Furthermore, upon a 10-day follow-up, she reported that there were no urinary incontinence issues following the exercise intervention. She showed fantastic improvements and achieved the highest MPS score within the three cases, only two points away from being ranked "Proficient Movement."

The post-intervention VAS pain score was No pain. The post-intervention MPS was 18/26 (Competent).

DISCUSSION

The frequency of chronic, disabling LBP has increased significantly during the past two decades, as has the cost of treating it. As the second most prevalent cause of disability in the US, 80% of the general population will have a substantial episode of LBP at some point in their lives, resulting in 149 million days of work missed per year, for a total estimated cost of $100–200 billion.[6] Shoulder pain has a prevalence of 16–34% in the US, with rotator cuff injuries responsible for 4.5 million doctor visits per year alone.[7] Furthermore, it is estimated to be the third most common MSK complaint in the UK primary healthcare.[8] Shoulder conditions, although not as common as LBP, are still very complicated, with up to 50% of the patients not improving 18 months following their initial presentation.[8] Moreover, shoulder interventions can be costly and do not always yield the most favorable outcomes.[8] Over 60% of women in the US experience some type of urinary incontinence.[9] This number is significantly rising; some hypothesize that this may be due to obesity and/or population changes.[9] However, the statistics show women over 70 years old, with an >40 body mass index or those who gave birth vaginally had the strongest association with urinary incontinence (UI).[9]

The MSK injuries carry a significantly sizeable financial disease burden of $176.1 billion annually in the US alone.[1] With the prevalence of LBP rising, the poor long-term health outcomes associated with shoulder injuries, and the significant rise of UI in females over recent years – it is clear other strategies must be explored.[6,8,9] It is essential to investigate efficient and practical conservative treatment approaches used by allied health-care professionals. The MD clinical model described by David Johnson offers a paradigm shift in MSK rehabilitation strategy by defining a disease process causing MSK pain symptoms, defining proficient movement points of performance for the lumbopelvic spine, and setting forth a treatment protocol to restore movement proficiency.[10] In alignment with David Johnson, the MPS Model was created as a standardized assessment model that can be reproduced and taught to allied health-care professionals worldwide to assist in diagnosing and identifying the disease that is MD.

Moving forward, the proposed suggestion is that current rehabilitation guidelines be reconsidered to acknowledge MD as a distinct disease entity. The various symptoms, both clinical and structural, string together one common similarity – they have all been caused by MD, which is currently poorly described and categorized. The MPS scale draws the therapist's attention back to movement quality and enables a structured method for recording the severity of MD over time.[11] A positive feedback cycle is envisaged to accelerate the process of pain and disability when MD is not resolved effectively. Pain causes MD, and this, in turn, causes more pain. As a result, the affected individual's functional capacity rapidly declines, accompanied by a contraction of lifestyle movement activities of daily living. This keeps functional demands in check with the affected individual's declining functional capacity.[5,12] Further research should explore specific movement quality-based interventions across various populations and symptoms.

CONCLUSION

This study examined the global impact of MSK injuries and the benefits of functional movement as a specific therapy. It is necessary to provide proper education of such knowledge to our allied health-care professionals to reduce the burden on primary healthcare, surgical interventions, and pharmaceutical consumption. The potential impact of a movement therapy paradigm shift on patients and the effectiveness of the MSK rehabilitation industry is enormous. While these reported cases are a start in the right direction, our clinical model and observations still require validation from further high-caliber investigations.

AUTHORS' CONTRIBUTIONS

All authors were involved in writing, reviewing, and editing this paper. BW created the intervention, treated the patients, and was heavily involved in the project's writing. The other authors were heavily involved in the research and writing of the paper, as well as reviewing the article and making edits as required. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

ETHICAL APPROVAL

Institutional Review Board approval is not required.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY STATEMENT

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

CONFLICTS OF INTEREST

There are no conflicting relationships or activities.

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