PAIN: Clinical Updates
OPEN
PAIN REPORTS

Integrated manual therapies: IASP taskforce viewpoint

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Abstract

Introduction: Manual therapy refers to a range of hands-on interventions used by various clinical professionals, such as osteopaths, osteopathic physicians, chiropractors, massage therapists, physiotherapists, and physical therapists, to treat patients experiencing pain.

Objectives: To present existing evidence of mechanisms and clinical effectiveness of manual therapy in pain.

Methods: This Clinical Update focuses on the 2023 International Association for the Study of Pain Global Year for Integrative Pain Care. Current models of manual therapy and examples of integrative manual therapy are discussed.

Results: The evolution of concepts in recent years are presented and current gaps in knowledge to guide future research highlighted. Mechanisms of manual therapy are discussed, including specific and contextual effects. Findings from research on animal and humans in manual therapy are presented including on inflammatory markers, fibrosis, and behaviours. There is low to moderate levels of evidence that the effect sizes for manual therapy range from small to large for pain and function in tension headache, cervicogenic headache, fibromyalgia, low back pain, neck pain, knee pain, and hip pain.

Conclusion: Manual therapies appear to be effective for a variety of conditions with minimal safety concerns. There are opportunities for manual therapies to integrate new evidence in its educational, clinical, and research models. Manual therapies are also well-suited to fostering a person-centred approach to care, requiring the clinician to relinquish some of their power to the person consulting. Integrated manual therapies have recently demonstrated a fascinating evolution illustrating their adaptability and capacity to address contemporary societal challenges.

Keywords: Manual therapies, Effectiveness, Models, Mechanisms, Integrative care

1. Introduction

Manual therapy is a term used to describe a range of hands-on interventions used by a diverse group of clinical professionals including osteopaths, osteopathic physicians, chiropractors, massage therapists, physiotherapists, physical therapists, athletic trainers, and some occupational therapists. Some of these professionals are autonomous primary health care professionals working independently, such as chiropractors, osteopaths, and physiotherapists/physical therapists (in most English-speaking countries). Others work under the direction of a physician, depending on the medical system.

Manual therapy is often sought by individuals experiencing musculoskeletal pain, particularly low back pain.[84] Manual contact (often in the form of touch) is a characteristic of all manual therapy

Key Points

1. Manual therapy is a term used to describe a range of hands-on interventions used by a diverse group of clinical professionals including osteopaths, osteopathic physicians, chiropractors, massage therapists, physiotherapists, and physical therapists
2. Manual therapy is one of the therapeutic tools available in these professionals' toolbox, and it constitutes a form of embodied, hands-on, nonverbal, communication with patients aiming at reassuring and empowering reengagement with activities that they value.
3. Manual therapies are effective for a variety of conditions with minimal safety concerns.
4. Modern integrated manual therapies are well-suited to fostering a person-centred approach to care and have adapted to the challenges presented by contemporary societal challenges effectively.

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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PR9 9 (2024) e1192

http://dx.doi.org/10.1097/PR9.0000000000001192

interventions. Therapeutic touch is key for patients seeking care from providers of manual therapy[3,19]; eg, among patients attending osteopaths in the United Kingdom (UK),[60] 89.5% of patients expect the osteopath to identify their problem area with their hands, and 97.5% of patients attending an osteopathic appointment in Australia expect at least half of their consultation to consist of manual therapy.[85] Despite high percentages, touch ranks 20th in patient expectations,[85] with respect, professionalism, and self-management advice ranking higher.[60] Forty-nine percent of patients attending osteopathic appointments would accept not receiving manual therapy, if it was best for their condition. Patient expectations of manual therapy professions are broader than just touch, as exemplified during COVID lockdowns.[55] Notwithstanding, an expectation of a "hands on" emphasis is not limited to patients as a qualitative analysis of chiropractors during the pandemic suggested that the perceived importance of such a therapeutic approach constituted a barrier to the consideration of remote consultations by such practitioners.[31] However, despite there being a continued historical emphasis by sections of these professions on manual interventions, one should not equate manual therapy with an exhaustive description of what these professions implement during therapeutic encounters, but rather as one of the therapeutic tools available in their toolbox. For example, the Guide for Physical Therapy Practice defines manual therapy as "The synergistic application of movement-oriented strategies that integrates exercise and manually applied mobilization and manipulation procedures." Manual therapeutic interventions might be considered as a specific form of human touch,[6] embedded in a complex therapeutic encounter. Consequently, because of this contemporary understanding, there has been a gradual expansion in the models used to assess and understand manual therapy that include key aspects of patient cognition: historically, models were mostly within the anatomical and biomechanical fields. Such historical models, which focus exclusively on the body to exclusion of cognitive aspects of the patient encounter, may carry a risk of symptom worsening and side effects due to negative treatment context (rather than treatment intrinsic factors).[56] On the other hand, the skilful curation of positive context that impacts patients' cognitive interpretation of the therapeutic encounter is likely an important factor in symptom improvement during manual therapy.[74,82] As these more contemporary explanatory frameworks have developed, evidence is accumulating that communication, emphasising the dyadic cocreation of the meaning of touch between 2 individuals,[36] rather than the mere application of a technique *by* the clinician *to* the patient are important goals of therapeutic encounters. For example, factors such as the expectation of positive change,[12,32,66] supported by the development of a strong therapeutic alliance between patients and practitioners, are strong predictors of important clinical outcomes during manual therapeutic encounters.[15,82] These explanatory frameworks are expected to evolve with new evidence.

In summary, it is believed that manual therapy constitutes a form of embodied,[36] nonverbal, communication with patients aiming at reassuring and empowering reengagement with activities that they value. As with other health care professions, maximizing clinicians' chances of success with patients in pain involves several factors, including communication, a strong therapeutic alliance,[15,57] education, and psychologically informed practice.

There are existing reviews on manual therapy,[47,52] but there is a lack of synthesis of the current thinking and evidence on manual therapy as a whole in its mechanisms, effectiveness, and how it can be used in an integrative model of care. The aim of this Clinical Update is to provide clinicians with an update on these issues.

2. Methods

The International Association for the Study of Pain organises Global Year themes each year. The aim of the Global Year advocacy campaign is to focus on a particular aspect of pain and raise awareness within the pain community and beyond. Part of the process involves inviting and facilitating discussions among experts in the field. The 2023 Global Year was Integrative Pain Care; the volunteer task force, led by Petra Schweinhardt and Kathleen Sluka, included preclinical and clinical researchers, pain clinicians, and patient advocates. Twelve topics were covered including integrated manual therapies.[39] This Clinical Update is based on evidence synthesised by Task Force volunteers in the Integrated Manual Therapies subgroup: experts from different fields brought in recent and key articles in their area, which were appraised within the team. The appraisal took in account the articles quality and suitability to the task force's topic. A synthesis was drawn through an iterative process and was then peer-reviewed by other members the IASP task force.

3. Results

3.1. Mechanisms

Manual therapeutic encounters contain a range of factors that can impact outcomes. Along with all clinical interactions, the mechanism of action of manual therapy includes both *specific* and *contextual* effects.[54]

3.2. Contextual factors

Modulation of contextual factors can elicit contextual effects that can be considered as the effects on an individual's condition, which result from human interaction, beliefs and expectations, and a sense of security.[25] Such effects are thought to be generated by top-down modulation of nociceptive signals through multiple components including high level psychosocial constructs such as expectation via prediction-based cortical pathways in the prefrontal cortex (executive), amygdala (emotional), and valency dopaminergic (reward) networks, coordinated via key pain matrix components such as the anterior cingulate cortex.[4,22] Such top-down modulation has historically been associated with nonspecific effects, perhaps better articulated as contextual effects in more contemporary paradigms. However, when using terminology such as "nonspecific," it is important to consider that well-characterised descending pain modulatory pathways have been shown to be associated with the highly specific binding of internal opioid–based neurotransmitters (endorphins) to the same receptors (μ opioid) as those bound to by pharmacological medicines such as external opioid drugs.[24] Given the epidemic use of opioid drugs for pain relief,[26] yet few if any risks of addiction to ethically provided positive modulation of clinical context, society might reflect why one effect (context) is characterised as nonspecific and somewhat peripheral to treatment mechanisms and the other (drugs) specific and legitimate, when they act through precisely the same biology using the same mechanism. This false nonspecific/specific dichotomy may underlie historical manual profession positions that place emphasis on supposed "specific" body-based interventions whilst marginalizing psychosocial interventions as "nonspecific" likely to the detriment of the patient. Notwithstanding, due to design heterogeneity in manual therapy trials, the size of such effects varies, with a recent rigorous systematic review and meta-analysis of three-arm trials of

physical and psychological interventions finding that overall, such effects ranged from c. 20% to 75%, with larger effects in hands-on control possibly related to control credibility.[54]

3.3. Evidence of specific effects from animal studies

The effects of various types of massage or manual therapy have been examined in rodents and rabbits. These animal models may provide insight into the "specific" effects of manual therapy, as they are less affected by contextual factors. This is because, despite rats being highly sociable, nonprimate mammals lack the cognitive machinery to generate "theory of mind" (ie, the ability to infer what other members of a species group are thinking),[73] which likely underlies the reasons context in treatment settings is important in human subjects.[79] In addition, the use of rodent models allows direct visualization of nervous system responses to therapies.[13] That said, there are 2 general approaches delivering manual therapy to animals—whether to deliver the therapy using machines or hands. These differ in that most animals are anesthetized for machine driven force-based therapy, which removes any potential influence of contextual factors, and one can precisely quantify the forces delivered using a machine approach. In contrast, the use of hands as delivery of therapy to animals has the advantage of close emulation of the clinical setting in which the therapy is performed on unanaesthetised humans and does not require the design and manufacture of special devices that cannot replicate human palpation skills. We will discuss findings of each approach.

Butterfield and colleagues developed a device to perform cyclical compressive loading in anesthetized rabbits, which they termed a "massage mimetic."[20] Forces used on the rabbit tibialis anterior muscles were scaled down from that used on human paraspinal muscles. They observed reduced leukocytes and cellular infiltrate in muscles after 30 min/d, for 4 days, of massage-like cyclic compressive loading that began immediately after a single bout of eccentric exercise performed at muscle damaging levels.[20,49] Acutely, the 4 days of cyclic compressive loading immediately after muscle damage also improved the muscle viscoelastic properties.[20,49,88] Early treatment was key. Muscles that received immediate treatment after intense exercise (continued every 24 hours for 4 days) exhibited only minimal myofiber disruption and less inflammatory cell infiltration (neutrophil and inflammatory macrophages) than muscles that received the same treatment 48 hours later.[20,49–51] Similar cyclical compression of anesthetized rat and rabbit hindlimbs reduced the numbers of cells expressing tumour necrosis factor alpha (TNF-α) and monocyte chemotactic protein-1 (MCP-1/CCL2) in muscles after hindlimb immobilization.[76] A robot-assisted mechanical therapy resembling deep tissue therapy prevented histological markers and behavioural indices of muscle damage after experimental stroke.[81] As a last example, a treatment designed to emulate cross-fibre massage in anesthetized rats reduced pain behaviours induced by experimental subcutaneous inflammation.[62] Thus, in studies in which mechanical loading was applied to anesthetized animals using devices, hypotheses that manual and massage therapies can reduce tissue inflammation and indices of muscle damage is supported. These reductions were associated with reduced behavioural indices of pain and improved muscle properties.

Provision of manual therapies to unanaesthetised rats has been examined using a rat model of overuse in which injury is induced by repeated performance of a reaching and lever pulling task for 2 h/d, 3 d/wk, for 3 to 15 weeks. Manual therapy techniques were used to treat the upper extremity. These techniques included forearm skin rolling, gentle mobilization, upper extremity traction, deeper massage, and wrist joint mobilization. In the initial studies, manual therapy was provided concurrently with task performance. This concurrent treatment effectively prevented the development of tissue pathologies, nerve electrophysiological changes, and sensorimotor behavioural declines.[10,16,17] Long-term studies have found that preventive manual therapy can reduce task-induced inflammatory responses in nerve, muscle, and tendinous tissues (eg, reductions in activated macrophages), as well as extraneural, muscle, and tendon fibrosis.[10,17] Fibrosis is defined as an increased collagen production and deposition, and increased transforming growth factor beta (TGF-β) levels (a fibrosis related cytokine). In a short-term study, manual therapy was found to reduce nerve inflammation and fibrosis.[16] Concurrent administration of manual therapy treatments prevented or improved several negative task-induced behavioural declines.[10,16,17] For instance, grip strength was maintained by the manual therapy treatment in task rats (as opposed to decreased in untreated task rats), and somatosensory hypersensitivity did not develop or was improved with continued manual therapy treatment. Underlying mechanisms of improved sensorimotor behaviours are most likely the result of treatment-induced reduction or prevention of inflammatory cell infiltration and inflammatory cytokine production, and/or increased tissue levels of interleukin 10 (IL-10; a potent anti-inflammatory cytokine).[10] This is postulated from studies showing that increased numbers of activated macrophages and inflammatory cytokines are known to enhance pain and reduce grip strength in both animals and humans.[42,67,78] The tissue inflammatory and fibrogenic changes were reduced after manual therapy treatment. This may have been due to reduced inflammation, as demonstrated in a model after anti-inflammatory drug treatment,[2] or the disruption of collagen fibrils, as discussed below in a mouse stretching model.

In mice, active stretching has been shown to reduce the number of neutrophils and inflammatory macrophages in subcutaneous connective tissues after carrageenan injection.[11,27] In addition, manual mobilization or brief active stretching of the back reduced subcutaneous connective tissue fibrosis induced by subcutaneous microsurgical injury.[5] Furthermore, it has been found that massage therapy can positively impact tenocyte metabolite activity by increasing the number of collagen fibrils in tendon.[58]

The insights generated by animal models have been difficult to translate into effective treatments in humans.[92] Human pain, embedded as it is in complex social and cultural settings intimately related to the generation of meaning and facilitated by highly developed theory of mind, means simple transference of animal results to human care settings should be done cautiously, albeit that physiological and cellular effects of manual therapy may indeed be mimicked in human subjects.

3.4. Evidence from human studies

Mechanoreception enables humans and animals to detect and respond to certain kinds of stimuli, including touch, sound, and changes in pressure or posture.[80] Touch is a sensory modality that transmits signals, which feed into 3 different systems: proprioception, which is the perception of the body's location, movement, and position; exteroception, which is the perception of stimuli external to the body; and interoception, which is the perception of the body's internal state through stimuli internal to it.[46] Manipulation can be applied to most joints in the body, but research has focused mainly on the spine.[29,75] It is defined as the "separation (gapping) of opposing articular surfaces of a synovial joint, caused by a force applied perpendicularly to those articular surfaces, that results in cavitation within the synovial fluid of that joint."[38] The mechanisms that explain

manipulation are unclear.[37] Historical models of manipulation are being challenged, including the importance of the specificity of the site where the manipulation is applied. A systematic review of randomised control trials comparing the application of manipulations to candidate and noncandidate sites found no significant differences between groups, ie, the site of manipulation is not correlated with clinical outcomes.[69] There is some evidence of changes in range of motion,[18,65] but the effects found are not always significant in clinical outcomes or duration when tested in isolation.[91] Spinal manipulation may influence inflammatory and cortisol levels: a meta-analysis with 737 participants found that various biochemical markers, including cortisol levels and interleukins, are influenced immediately after the application of the manipulation; but substance-P, neurotensin, oxytocin, orexin-A, testosterone, and epinephrine/norepinephrine are not influenced.[59] These changes may provide an avenue for understanding some of the mechanisms of manipulation, but it is still unknown whether these changes have clinical utility. Manipulation is a good example of the multifactorial nature of mechanisms underlying clinical improvements observed.[13] Emerging evidence increasingly suggests psychosocial factors,[82] such as expectation and the relationship between practitioner and the patient, to be key variables that underlie changes in clinical outcomes.[13,82] This supports contemporary evidence of top-down predictive processing of pain where high-level interpretations of the context and meaning of the clinical encounter, interwoven with previous experiences and therefore expectations of future events, drive changes in pain perception.[61,70]

Responses to manual therapeutic interventions are influenced by various factors including stroking velocity and skin temperature.[46] Regarding the impact of manual therapy on inflammation, 30 minutes of massage therapy in human subjects can return serum levels of several proinflammatory cytokines (IL-8, TNFα, and CCL2/MCP) to baseline levels. This was observed in healthy male athletes after sprint exercise.[89]

Several clinical studies have shown that pain symptoms associated with median neuropathies can improve after massage or manual therapy.[33,40,41,86,90] Furthermore, manual therapy mobilization has been employed to treat radial fractures after a period of immobilization.[64] Soft tissue mobilisation was used in about 40% of cases and joint mobilisation in about 30% during the immobilisation phase, and both approaches were used in about 85% of cases after immobilisation. The rationale for using these hands-on approaches was varied and included improving stiffness (in 40% of cases) and range of motion (in 20%).

The literature on manual therapy mechanisms is mixed, possibly due to variations in treatment type, timing of administration, assessment tools, and high variability in diagnoses.[9,86] Future research should aim to improve our understanding of how manual therapy works during clinical encounters, by examining the interplay of different mechanisms.

3.5. Effectiveness

The range of effectiveness measures related to manual therapy relates to the mechanisms of actions, including physical properties and emotional as abovementioned, leading to different outcomes, including analgesic, affective, and somatoperceptual.[45] In this section, an overview of the current evidence regarding the effectiveness, or lack of, for manual therapy is provided.

Manual therapy is recommended in most clinical guidelines for nonspecific musculoskeletal pain management, for both acute and persistent pain[72] and for various conditions (eg, National Institute for Health and Care Excellence (NICE) guideline [NG59] for low back pain,[68] NICE guideline [NG226] for osteoarthritis).[71] A meta-analysis with 4613 patients found that massage therapy is effective for people with musculoskeletal pain, mostly when compared to no treatment, and weakly effective compared to other interventions.[30] The evidence regarding all manual therapy approaches and for different conditions is synthesised in **Table 1**.

There is a lack of evidence whether any form of manual therapy carries a risk to negatively impact patient autonomy. When an intervention focusing on education and self-management strategies was compared with or without manual therapy in a biopsychosocial framework, the number of appointments was similar between groups.[48] The context of treatment may affect patient autonomy, and more work is needed in this field by professions who use manual therapy.[56]

A meta-analysis of trials and prospective cohort studies on the adverse events associated with manual therapy found that the incidence of minor and moderate adverse events was approximately 41%, and the incidence of major adverse events was estimated at 0.13%.[21] A more recent retrospective analysis of adverse events associated with chiropractic spinal manipulative therapy and a meta-analysis of massage therapy for musculoskeletal pain[30] found similar results.[23] A non–peer-reviewed mixed methods study of 1082 osteopaths and 2057 patients in the United Kingdom[87] found similar results, finding no association in adverse event outcomes when comparing patients who had or had not received manipulation.

4. Discussion

There are many manual techniques, with the most commonly described and used being articulation/mobilisation, massage and soft tissue manipulation, spinal manipulative technique/high velocity thrust, and muscle energy technique.[34] Manual therapies appear to be effective for a variety of conditions with minimal safety concerns. In this discussion, we propose how modern integrated manual therapies could be considered, how integrated manual therapies can be implemented, and why manual therapies are well-suited to fostering a person-centred approach to care.

Manual therapies are influenced by a number of intertwined mechanisms, which are not always explicitly considered in the models used to inform clinical, educational, and research practice. There has been a gradual increase in awareness of the contextual factors involved in the use of manual therapy, with a shift in perception of these factors from being undesirable to embracing them. It is hoped that curricula will integrate this important change, with the inclusion of distinct modules in communication, therapeutic alliance, and evidence-based advice (not an exhaustive list). Furthermore, curricula should include content regarding the nocebo effects and risks associated with manual therapies,[21,56] in order to ensure that clinicians are adequately informed and able to provide their patients with all the information required to make an informed decision regarding the most appropriate course of action and whether they wish to provide their informed consent.[35]

Manual therapy professions are more than just hands-on. The term *manual therapies* can be misleading as it blurs what the professions do with some of the techniques/interventions they use. Emerging evidence suggests that there is some support for transdisciplinary integrative care, where manual therapy is used alongside psychological interventions (eg, acceptance and commitment therapy).[1,7,28] This provides a different perspective on manual therapies. The aforementioned examples of integrated manual therapies provide novel insights into the role

Table 1

Effect of manual therapy on pain and function by condition.

	Pain Effect size (strength of evidence)	Function Effect size (strength of evidence)
Chronic tension headache	Moderate† (+) Short term and long term	Moderate† (+) Short term
Cervicogenic headache	Large (intensity) and moderate-to-large (frequency) (+)‡ Short term	Small-to-moderate effect (intensity and frequency) (+)‡ Short term and long term
Fibromyalgia	Small† to moderate* (+) Long term	Small† to moderate* (+) Intermediate term†
Low back pain (acute)	Moderate (+)*	Moderate (+)*
Low back pain (persistent)	Small (++)† Short term: massage Intermediate term: manipulations	Small (+)† for both short & intermediate terms
Low back pain (pregnancy/postpartum)	Pregnancy: Moderate (+)* Postpartum: Small (++)*	Pregnancy: Moderate (+)* Postpartum: Small (+)*
Neck pain (persistent)	Small (+)† to moderate (+)* Short term	Moderate (+)†,* Short term
Osteoarthritis knee pain	Moderate (+/++)† Short and moderate terms	Small (+)† Short-term effects
Osteoarthritis hip pain	Small (+)† Short term	Small (+)† Short and intermediate terms

Short term: 1 to <6 months; intermediate term: ≥6 to <12 months; long term: ≥12 months.
Effect size: none, small, moderate, or large improvement.
Strength of evidence: + = low (yellow), ++ = moderate (green), +++ = high (blue).
*[8]; †[83]—these 2 reviews were chosen for their breadth and quality.
‡[14] was chosen for its quality.

and scope of manual therapists. They illustrate how these professions can adapt to societal challenges, such as the ongoing rise in mental health disorders and persistent pain.[43,44] There is currently a lack of evidence to suggest that manual therapies can help patients with mental health problems, although emerging evidence[77] makes it a possible avenue for future research. Manual therapists providing transdisciplinary integrative care must ensure that patients understand the approach, which may differ from their initial expectations. Clear communication is essential both before and during the appointment. One effective framework for implementing this approach is the three-talk model for shared decision making.[35] Shared decision making enables clinicians and patients to collaborate in discussions and decisions about the best management for the patient. This model disrupts previous models of care where clinicians made treatment decisions. Part of the informed consent process for manual therapy is ensuring that patients understand the benefits, risks, and alternative management options. It is also important to explain what would happen if no intervention were provided. This process is embedded with shared decision-making and evidence-based practice.[53]

Manual therapies are well-suited to fostering a person-centred approach to care. The delivery of care, including the duration of some appointments, provides an optimal environment for manual therapists to gain an understanding of the individual in front of them and for the individual to have time to explore and share their concerns and expectations. This process ultimately enables both parties to collaboratively decide what would be the most appropriate management plan and approaches. This flexibility regarding the setting of the management plan is in accordance with the principles a shared decision-making paradigm[35] and also reflects the state of the evidence regarding specific interventions: a systematic review of noninvasive, nonpharmacological treatment for chronic pain found that all interventions in the management of persistent low back pain had at best moderate effects.[83] The combination of management strategies may provide a suitable solution to the limited impact of existing pain conservative management options. It enables clinicians and patients to decide which interventions are most appropriate in the context of the patient taking in account in the light of the existing evidence and the clinician's experience. This cocreation of management plans requires excellent communication skills, trust, and time and disrupts the long-established hierarchy of power in health care encounters.[63] Providing manual therapy in such a model of care may support efficient delivery of services, with particular benefit where access to multidisciplinary care is restricted.

The evidence synthesised did not allow direct comparison of techniques in efficacy for specific conditions. The existing evidence may suggest that different techniques or approaches may have similar effects,[83] but further research is needed to understand mechanisms and effectiveness in more detail.

This narrative review relied on the authors' knowledge and understanding of the topic. Existing systematic reviews have been mentioned in the introduction. Some literature may have been missed, and this piece of work is not systematic but should be seen as an update of clinicians, educators, and students on what is the current state of the evidence in the field of manual therapies. One of the strengths of this article is from the multidisciplinary of the team of authors.

Disclosures

J.D.R. has received grants from the Osteopathic Foundation, the University College of Osteopathy, the General Osteopathic Council, and the Institute of Osteopathy; and honororia payments from Kookie Learning, Nordic Osteopathic Alliance, Metropolia University, Centre International d'Ostéopathie, and Osteopathy Europe; and has a leadership role in the Strengthening

Osteopathic Leadership and Research programme (UTS Sydney, Australia). D.N. received grants from Research Innovation Fund (UK) and the Chiropractic Research Council. M.F.B. receives fudning from Temple University and NICCH/NINDS. J.B. has no conlict of interests to report.

Acknowledgements

Data availability statement: No original datasets were generated over the course of this research.

Article history:
Received 9 February 2024
Accepted 2 August 2024
Available online 29 October 2024

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