

NORDIC OSTEOPATHIC JOURNAL 2026

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NORSK OSTEOPATFORBUND

Svenska Osteopatförbundet

Suomen Osteopaattiliitto ry · Finlands Osteopatförbund rf

Danske Osteopater

OSTEÓPATÍA
OSTEÓPATAFÉLAG ÍSLANDS

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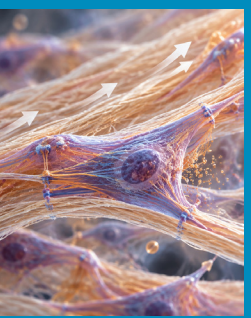

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Words from the editor

Dear readers and Colleagues,
We are proud to present this year's edition of the Nordic Osteopathic Journal. Our goal is to offer a publication that provides both informative and engaging content, and we hope we have succeeded in doing so. Within these pages, you will find a variety of articles that we believe will appeal to your professional interests and curiosity.

Once again, the Nordic Osteopathic Journal represents a collaborative effort between all the Nordic countries, and we would like to extend our sincere thanks to all contributors for their commitment and enthusiasm.
I hope you enjoy reading this issue as much as we enjoyed creating it.

Warm regards,



Ingrid Nicander
Osteopath and editor

Dear colleagues,

We are proud of being able to share a really good edition of the Nordic Osteopathic Journal containing research, updates, and perspectives on osteopathic clinical practice. The journal takes pride in being accessible to all interest holders and not only osteopaths. We believe in the value of sharing and are proud of being able to continue to deliver the Nordic Osteopathic Journal as open access. You can easily find all editions of the Nordic Osteopathic Journal via our website. Feel free to read and share.

Many thanks to the Swedish Osteopathic Association for excellent hosting of the 7th Nordic Osteopathic Congress in Gothenburg. A beautiful venue and an impressing lineup of good lecturers, delivering presentations of great interest and relevance for osteopathic practice. This years focus on cooperation and context was very well aligned with the emerging evidence base pointing out the need for person-centred collaboration within healthcare in general, including osteopathic healthcare. It was a great experience to see that NOC continues to attract osteopaths and other healthcare professionals from all over the Nordics and the global community, with attendees from a large number of countries.

The 8th Nordic Osteopathic Congress will be in Helsinki, Finland, 5-6th November 2027. This event will have yet another level of international vibe as the Nordic Osteopathic Alliance joins forces with the Osteopathic International Alliance, making the NOC the place to be for the osteopaths in 2027. We are grateful for this opportunity to present and promote the Nordics and developments within osteopathic healthcare for a wider audience and really look forward to welcoming many good colleagues from the global osteopathic community. Stay tuned for updates via our website – registration will open early 2027.

Best wishes,
Nordic Osteopathic Alliance

Nordic Osteopathic Alliance



Tomas Collin
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Regulated since: 2022
Number of members: 466

Norsk Osteopatforbund continues to promote Osteopathic Healthcare in Norway

Earlier this year, Norsk Osteopatforbund, published results based on a members survey mapping osteopathic healthcare provision in Norway. We are glad to see that osteopaths are well distributed throughout Norway, providing care for many different patient groups, combining osteopathic manual treatment with active measures and guidance. According to a large-scale public survey conducted by Kantar, patients support osteopaths to be given permission to refer to diagnostic tools such as imaging, and specialist care. It is also clear that a person-centered holistic approach is highly appreciated by patients. Osteopaths are well equipped to act as first contact practitioners and this is something we work hard to implement better in the Norwegian health care system.

To promote research and especially to gather osteopathic healthcare data is at the top of our priorities. We are contributing to a Norwegian adaptation of the Osteopaths' Therapeutic Approaches Questionnaire (Osteo-TAQ), which supports research into osteopathic practice and professional identity. This is a project done in collaboration with our Danish colleagues.

Norsk Osteopatforbunds continues to work tirelessly to promote osteopathic healthcare as a part of regulated Norwegian healthcare by actively responding to and participating in hearings and meetings with state and other interest holders.



Viktor Steinn Bonometti
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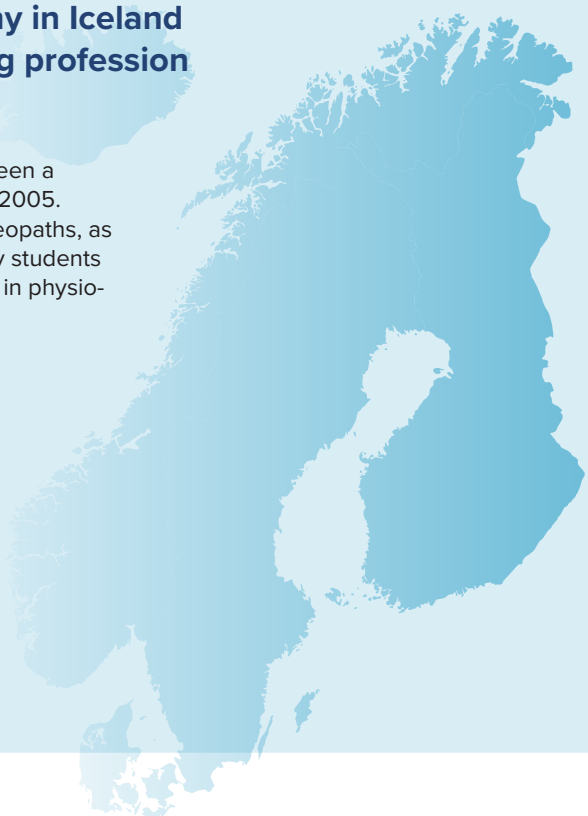
Regulated since: 2005
Number of members: 20 and a few more pending

Osteopathy in Iceland - a growing profession

Osteopathy in Iceland has been a healthcare profession since 2005. There are 20 registered osteopaths, as well as third-year osteopathy students who hold a previous degree in physiotherapy.







Tanja Kakko
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the Finnish Osteopathic Association

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Regulated since: 1994
Number of members: 180
including students

Finnish osteopathy looks ahead to a landmark year in 2027

The Finnish Osteopathic Association has represented osteopaths in Finland since 1988 and today has approximately 180 members both practising osteopaths and students of osteopathy.
In Finland, osteopathy is a protected-title healthcare profession, and osteopaths are registered and overseen by the Finnish Licensing and Control Agency. The Association works to strengthen the position of osteopathy as a regulated part of healthcare and rehabilitation in Finland, increase awareness of osteopathy, uphold professional competence and ethical standards, and bring the osteopathic community together. We also organise continuing professional development annually and are committed to advancing osteopathic research and education in Finland.
The year 2027 will be a particularly important year for Finnish osteopathy. On 5–6 November, Helsinki will host the Nordic Osteopathic Congress in Helsinki. At the same time, the Finnish Osteopathic Association will have the honour of hosting the Osteopathic International Alliance's 2027 autumn meeting and congress, bringing the international osteopathic community and other healthcare professionals and educational parties together in Finland. We look forward to seeing our colleaques from the Nordics and globally. Welcome to Helsinki in November 2027!



Emmelie Hansen
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Number of members: 247
including students

Update from Svenska Osteopatförbundet - an important year for osteopathy in Sweden

2026 has been an important year for osteopathy in Sweden, marked by progress towards regulation and stronger Nordic and international cooperation.

The government inquiry SOU 2025:63 concluded that osteopaths meet all requirements for regulation except a Swedish higher-education programme with a strong scientific foundation. In June 2026, the Swedish Higher Education Authority (UKÄ) confirmed that NIMM's osteopathy programme meets higher-education standards. SOF considers this the final requirement fulfilled and has urged the Riksdag and Ministry of Health and Social Affairs to move the process forward.

NIMM's programme is now established in Sweden, although classes have not yet begun. This represents an important milestone for the profession. Following September's close general election, SOF will continue advocating for regulation with the new parliament and government.

Nordic Osteopathic Congress 2026
In September, SOF and the Nordic Osteopathic Alliance (NOA) hosted NOC 2026 in Gothenburg. The congress brought together osteopaths, educators and healthcare professionals from across the Nordic countries and Europe, highlighting the importance of collaboration on shared challenges in education, recognition and regulation.

SOF became an associate member of the Osteopathic International Alliance (OIA), strengthening its global network alongside NOA and Osteopathy Europe. This provides valuable international experience in the continued work towards regulation in Sweden.



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Regulated since: 2018
Number of members: 440 including students

Danske Osteopater Continues to Strengthen the Profession Through Research, Collaboration and Advocacy

Danske Osteopater continues to advance the profession through health policy engagement, research, professional development and interdisciplinary collaboration.

In a research project led by Health Sciences University (HSU) and in close collaboration with our colleagues in the Norwegian Osteopathic Association (NOF), we are contributing to a Danish adaptation of the Osteopaths' Therapeutic Approaches Questionnaire (Osteo-TAQ), which supports research into osteopathic practice and professional identity. Andreas Sønderriis, one of the co-leaders of the Danish Osteopathic Research Community, represents Denmark in this collaboration.

Our annual Congress and General Meeting are key opportunities for our members to enhance their professional development and networking. To improve accessibility for members, the Congress now rotates between three locations across Denmark. After this year's Congress in Middelfart, we look forward to welcoming colleagues to Aarhus in 2027.

Our annual half-day conference for healthcare interest-holders continues to promote dialogue and interdisciplinary collaboration. The next conference, on 13 May 2027, will focus on women's health.

We are currently planning an additional interdisciplinary conference for healthcare professionals, organisations, politicians and decision-makers, with the prospect of exciting collaborations with other organisations. The conference will explore how person-centred, inclusive communication, with a focus on minority groups and health inequalities, and better cross-professional and cross-sector communication can improve health outcomes, patient safety, and collaboration. As part of this dialogue, we will advocate for osteopaths to be integrated into the public healthcare workforce. This would improve access to osteopathic care regardless of socioeconomic background and contribute to a more integrated, equitable healthcare system.

Through these initiatives, we remain committed to advancing osteopathy as a natural and integral part of the Danish healthcare system for the benefit of all citizens.

Osteopathy Across Borders

– OIA Annual Conference 2026 in Paris

Text: Hanna Tómasdóttir

On 5–7 November 2026, the Osteopathic International Alliance (OIA), together with L'Unité Pour l'Ostéopathie (UPO), brought together osteopaths, osteopathic physicians, educators, researchers and professional leaders from around the world for its Annual General Meeting and International Conference in Paris, France.

Founded in 2003, the OIA was established to unite and strengthen the osteopathic profession globally. The organisation established official relations with the World Health Organization (WHO) in 2018. Today, the OIA represents 82 organisations across 23 countries and five continents, bringing osteopathy and osteopathic medicine together under one global alliance.

The Paris conference, hosted at the historic Maison de la Chimie, provided a platform for international exchange, professional development and collaboration. The programme covered a broad range of topics, including osteopathic research, education, professional regulation, clinical practice, patient safety and the integration of osteopathy into healthcare systems. A particular emphasis was placed on the complexity of patient care and the importance of evidence-informed practice.

The Nordic countries have also played an active role in the OIA's international work. Laura Lee Calonius (FIN) and Hanna Tómasdóttir (DK) served on the OIA Board of Directors for two terms and concluded their Board service at the Annual General Meeting in Paris.

2004 Founded

23 Countries

82 Member organizations

As the OIA moves forward with its strategic priorities for 2026–2029, international cooperation remains essential to strengthening professional standards, advancing research and education, and ensuring that more people worldwide have access to safe, high-quality osteopathic healthcare.

The Paris conference offered an important opportunity to reconnect, exchange knowledge and continue building a stronger, more unified global osteopathic profession.

Nordic Osteopathic Congress 2027

DATE: 5-6 November 2027
PLACE: Helsinki, Finland
VENUE: Metropolia University

THEME: Rehabilitation | Education | Public healthcare cooperation
INFO: nordicosteopathicalliance.org/noc-finland-2027/

Organized in collaboration with the Osteopathic International Alliance (OIA)

NORDIC OSTEOPATHIC ALLIANCE

OIA



Moral distress and shared decision-making in osteopathic clinical practice

Text: Niklas Sinderholm Sposato

Shared decision-making is widely regarded as ethical best practice and sits comfortably with the person-centred self-image of osteopathy. This paper explores how the expectation to share decisions may itself become a source of moral distress in osteopathic practice, and why such distress may be difficult to detect.

Background

In shared decision-making clinician and patient reach decisions together, drawing on the best available evidence and the patient's own values and goals [1]. In osteopathy, the model is often presented as a natural extension of the profession's person-centred self-image, and is promoted by regulators such as the UK General Osteopathic Council [2].

Less attention has been paid to what happens when the process does not lead to agreement. In neonatal intensive care, Prentice and Gillam [3] have argued that the expectation to share decisions can constrain physicians' ability to act on their judgement of the patient's best interests, and that this may give rise to moral distress.

Given that most osteopaths in the Nordic countries, and elsewhere, work alone in private practice, often outside publicly funded healthcare, it is somewhat surprising that the question of moral distress has not been formally addressed in osteopathy.

A brief conceptual note on moral distress

'Moral distress' describes the psychological strain of having clear judgement about what ought to be done while being prevented from acting on it. The constraints may be internal, such as fear or self-doubt, or external, such as institutional rules or the decisions of others; the focus here is on the latter.

Moral distress should be distinguished from a moral dilemma, in which competing principles point in different directions, and the clinician is left uncertain regarding what is right. In moral distress, the clinician is unable to act on what they believe is right even though there is no uncertainty to consider, and it is this experience of acting against one's own convictions that threatens personal and professional integrity. Lingering distress, or moral residue may accumulate so that each similar situation provokes a stronger crescendo effect [4]. This is potentially relevant to osteopathy, where such situations are seldom dramatic but may instead recur in a low-grade manner week after week.

The osteopathic context

The most recent global review by the OIA (2026) estimates that there are around 89,000 registered osteopaths worldwide. More than 60 per cent work in private practice, and osteopathic care is included in state-funded healthcare in only eight countries. The title is protected and the profession regulated by statute in 15 countries, recognised as a health profession in 16, and legally permitted in 31.

Most osteopaths thus occupy a dual position. In the treatment room, the osteopath assesses, diagnoses and proposes treatment on their own responsibility, usually without referral. In the wider health system, the osteopath may have limited formal means to refer, request investigations or access the patient's records, and depends on others to enable the patient to reach the care the osteopath judges necessary. The ethical climate of osteopathic practice is therefore shaped less by a ward or team than by the treatment room, the market and the regulatory framework. The economic, professional and patient-rights issues identified in private physiotherapy practice [5] are likely to apply to osteopaths as well and may be amplified where the profession is poorly regulated.

Potential limiters to shared decision-making

The person-centred self-image of osteopathy is not always matched by practice. Browne, Bettles [2] reported that around 95 per cent of UK osteopathic patients were satisfied overall, but ratings were lower for whether the osteopath fully understood their concerns and helped them take control. Rajendran, Beazley [6] observed how UK osteopathy students involved patients in decisions, and Thomson, Petty [7] described how the therapeutic approaches of experienced osteopaths, categorised as Treater, Communicator or Educator, shape the extent of patient involvement.

At the same time, the profession has moved from a predominantly biomechanical towards a biopsychosocial understanding of pain. Sampath, Darlow [8] found that osteopaths often endorse a biopsychosocial model in principle, while experiencing it as a potential threat to a professional identity built on manual treatment. As understanding shifts, the osteopath's judgement may increasingly diverge from patient expectations. A patient may expect a kind of passive biomechanically framed treatment associated with a more traditional model of osteopathic care, while the osteopath has come to view manual interventions merely as part of a broader therapeutic approach.

Three situations appear particularly relevant; a patient wishing to continue a treatment that the osteopath judges no longer fruitful: a patient declining further investigation or referral the osteopath necessary; and a patient holding on to an outdated explanation of their symptoms, such as something being 'out of place', which the osteo-

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path believes risks reinforcing fear and avoidance. Shared decision-making can accommodate such disagreement as long as the conversation moves forward. When it does not, the decision is no longer shared, either the osteopath acts against their own judgement, or the patient may feel overruled.

Two circumstances make this impasse particularly difficult. The first is economic and is rarely stated openly. In private practice, the clinician has a direct financial interest in the patient returning. Continuing the treatment the patient requests is, to a certain extent, respectful of their autonomy but also a commercial interest. Suggesting fewer appointments or treatment elsewhere comes at a cost to the clinician. This is a possible conflict of interest shared by other medical professions in private practice [5], but when these two interests (respect for autonomy and the financial component) point in the same direction, it may be difficult, even for the most ethically attentive clinician, to know which of the two is driving the decision. The second is systemic. Where a hospital physician may discuss a case with colleagues or request an ethics consultation, an osteopath rarely has access to either. Where the title 'osteopath' is unprotected, declining to treat may also lead the patient to a practitioner with less training, so saying no does not necessarily protect the patient.

A constructed case

Anna, 52, has had persistent low back pain for five years and has seen the same osteopath every four weeks for two years, for treatment framed largely as correcting recurring mechanical dysfunctions. Her pain eases for a few days after each treatment but is otherwise unchanged, and she has gradually given up several activities she used to enjoy. She states that her back 'goes out' without treatment. On reviewing her care, the osteopath concludes that continued predominantly passive treatment is not helping and may be reinforcing the patient's belief that her back is fragile. Suspecting that poor sleep and work-related stress are contributing to her condition, the osteopath suggests a gradual increase in activity, less frequent appointments, and contact with primary care. Anna becomes upset, saying the treatment is the only thing that has helped, that she has not been taken seriously in primary care in the past, and that she wants to carry on.

The osteopath works alone, has no access to Anna's medical records and no formal route of referral. Furthermore, the osteopath believes that Anna is likely to seek someone else offering the same treatment, and knows that the title 'osteopath' is not protected. Anna is also one of her most regular patients. Having been taught that decisions should be made with the patient, treatment continues but leaves the clinician feeling ill at ease.

Although this case could be read as a dilemma between respect for autonomy and the duty to do good and avoid harm, it is better understood as moral distress. The osteopath is not uncertain but constrained by circumstances, such as the expectation of joint decisions, financial dependence, professional isolation and the absence of formal routes into the wider health system.

Implications

Prentice and Gillam [3] suggest that moral distress in physicians may be under-recognised, partly because physicians are expected to keep their emotions in check and partly because measurement instruments were developed for hospital nurses. No studies appear to have examined moral distress in osteopathy. In a study of 407 physiotherapists, Inbar, Doron [9] found moderately high levels of moral distress, with organisational constraints and futile treatment among the main sources. An osteopath in private practice often bears such distress alone, and it may take forms not readily recognised as ethical problems, such as quietly adjusting one's own judgement to what the patient wants.

For the profession, it points to the value of structured peer support, such as supervision groups or peer networks. For education, teaching about shared decision-making should include its limits, preparing students for conversations that do not necessarily end in agreement. For regulation and health policy, it stresses that statutory regulation and integration into the health system determine what avenues the osteopath has for acting on their judgement.

Conclusion

Shared decision-making is ethically sound and worthwhile, but, as in medicine, the expectation to share decisions may sometimes limit the clinician's ability to fully act in the patient's interests and thereby give rise to moral distress. In osteopathy, this is compounded by professional isolation, the commercial conditions of private practice and, in many countries, a position outside the wider health system. Such distress is probably common, but seldom visible. Better understanding of these issues and greater openness to intra- and interprofessional dialogue would probably reduce isolation and distress among clinicians and support ethically sound care.



Niklas Sinderholm Sposato

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Research fellow at The Centre for Osteopathic Research and Leadership (CORaL), Health Sciences University, London, UK
Programme Director at Nordic Institute of Manual Medicine (NIMM), Stockholm, Sweden

Treat the cause?

Text: Lau Saugman Hansen

> "This does not diminish the clinical value of manual therapy."

A number of osteopaths use expressions such as "we treat the cause" or "we do not just treat the symptoms, but the cause itself."

A simple Google search shows that this type of statement is still commonly used on Danish osteopaths' websites [1]. This view is largely based on osteopathic theory, which holds that assessment and treatment of the musculoskeletal, visceral, and craniosacral systems can identify and resolve the underlying cause of a patient's symptoms. Using low back pain (LBP) as a model, this article examines whether the claim of "treating the cause" is supported by scientific evidence.

Within osteopathy, the causes of LBP are often described as multifactorial. Visceral dysfunction affecting the thoracolumbar segments, vertebral "blockages," sacroiliac joint dysfunctions, visceral adhesions affecting pelvic or spinal mobility, and biomechanical chain reactions—for example, from a previous ankle sprain via the fibula and femur to the SI joint—are all highlighted as potential causes of LBP. These explanations are frequently rooted in biomechanics, vascularization, or nervous system function. Based on this understanding, it is assumed that correcting these findings also treats the cause of the patient's back pain [2]. However, this assumption presents several scientific challenges.

Manual therapy has documented efficacy for LBP [3,4], but the mechanisms through which manual therapy exerts its effects differ markedly from traditional osteopathic explanatory models [5–8]. For example, current research does not support the premise that manual techniques lead to lasting anatomical or positional changes in the spine or pelvic joints [6].

Biomechanical relationships are often described with reference to biomechanical chains or the concept of regional interdependence. Within osteopathy,



there are numerous examples of how restrictions in one part of the body are assumed to cause symptoms in another [9]. However, these specific osteopathic models have not been prospectively investigated as risk factors for the development of LBP. Furthermore, existing research shows that a wide range of biomechanical factors—including posture, leg length discrepancy, reduced hamstring flexibility, and foot posture—have not been shown to be consistent risk factors for LBP development [10,11]. Currently, there is no prospective evidence to suggest that these biomechanical relationships constitute independent causes of LBP.

It is important to emphasize that this is not a critique of manual therapy as a treatment modality. Manual therapy can have a clinically relevant effect on LBP, but likely through mechanisms other than the correction of biomechanical "lesions." Experimental studies suggest that manual therapy works through multiple components, including contextual factors, the therapeutic alliance, and the modulation of nociceptive processing and central pain mechanisms [7,8,12]. In practice, for instance, thoracic manipulation has been shown to have a similar effect on lumbar pain as lumbar manipulation, indicating that anatomical specificity is not decisive [13].

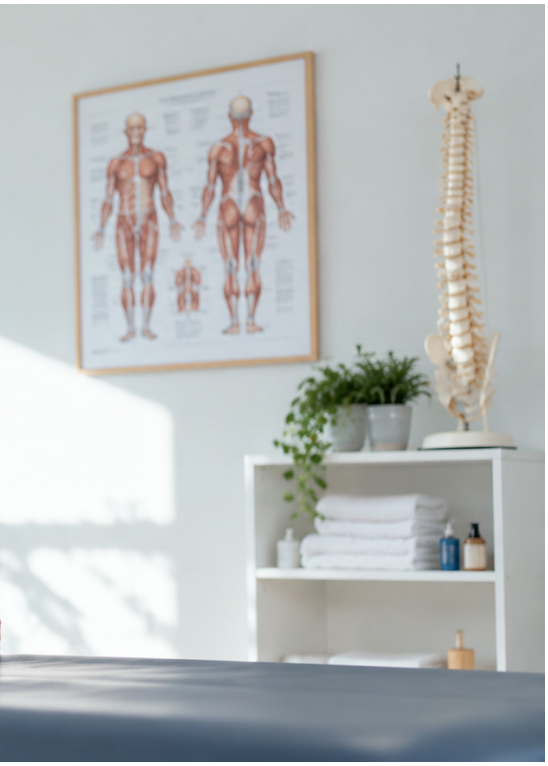
What Do We Know About the Causes of LBP?

In epidemiological research, prospective cohort studies are used to identify risk factors for disease. Subsequently, the Bradford Hill criteria can be applied to evaluate whether an observed association is likely causal.

For example, if one wishes to investigate whether scoliosis or leg length discrepancy increases the risk of LBP, a large cohort of pain-free individuals is followed over several years. At baseline,

structural asymmetries are recorded. Over time, the incidence of LBP between groups is compared, controlling for other known risk factors. This exact research question has been studied prospectively. The results demonstrate that scoliosis and leg length discrepancy do not increase the risk of developing LBP later in life [14].

Reviews based on prospective cohort studies generally show that the most consistently documented risk factors for LBP include prior episodes of back pain, smoking, obesity, sleep disturbances, depression, and high psychological distress. There is also evidence that prolonged driving, repeated trunk flexion or extension during the workday, and heavy lifting increase risk [15]. Conversely, biomechanical factors such as leg length discrepancy, scoliosis, foot posture, reduced hamstring flexibility, or erector spinae strength have not been shown to be consistent risk factors [15]. This does not imply that biomechanical factors are irrelevant to the individual patient. However, current research does not support the claim that classic osteopathic lesions serve as documented causal mechanisms behind the development of LBP.



Manual therapy retains a valid place in LBP management, but it should be viewed as one component of a broad, person-centered approach that considers the patient's overall biological, psychological, and social situation [5]. This perspective aligns well with Osteopathy Europe's definition of the profession: **"Osteopathy is a primary contact and person-centred healthcare discipline that supports a whole-person approach to all aspects of health and healthy development, principally by the practice of manual (hands-on) treatment."** [16]

This definition accurately reflects how many Danish osteopaths already practice. An internal survey conducted by Danske Osteopater showed that the majority of Danish osteopaths provide guidance on exercise, lifestyle, and general health [17]. Furthermore, the typical duration of consultations offers valuable opportunities to build a strong therapeutic alliance and optimize contextual factors, which are increasingly recognized as essential components of treatment efficacy.

Manual therapy remains a core element of osteopathic practice, and research supports its use across several musculoskeletal pain conditions [5]. However, the mechanisms accounting for its clinical effects appear to be predominantly neurophysiological and contextual rather than structural or biomechanical.

Conclusion

Is it time for osteopathy to abandon traditional biomechanical models as primary causal explanations for musculoskeletal pain? Current evidence indicates that LBP arises from a complex interplay of biological, psychological, and social factors, with established risk factors having minimal biomechanical basis. For other body regions, such as neck and shoulder pain, the link between biomechanics and future pain is similarly lacking [18–20], pointing to a complex etiology comparable to that of LBP.

This does not diminish the clinical value of manual therapy. It remains a useful therapeutic tool but likely operates through mechanisms other than the correction of structural or biomechanical "lesions." Osteopathy is well-positioned to maintain its identity as a person-centered profession—one that combines manual therapy with evidence-based guidance on movement, lifestyle, and general health.



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Bsc. Pt. M.D.O

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What Counts as Knowledge in Osteopathic Care?

Why Epistemological Flexibility Matters.

Text: Rafael Zegarra-Parodi, Francesca Baroni and Christian Lunghi

The different forms of osteopathic profession have been debated for decades. Several studies have described different interpretations of principles, training and how evidence-based medicine should be integrated to osteopathic profession. The tensions are widely acknowledged, but caution should be exercised in interpretation, as the differences may not be as great as commonly assumed. These differences may be a strength of the profession as part of modern healthcare.

Epistemology concerns how knowledge is produced, what constitutes legitimate evidence, and the criteria by which claims are accepted as valid. These questions are increasingly relevant as evidence-based practice challenges established assumptions and explanatory models, including those in osteopathic care. Epistemic humility involves recognizing the limits of knowledge, distinguishing between evidence and interpretation, and acknowledging uncertainty. Epistemological flexibility extends this position by considering how different ways of knowing can be critically navigated according to the questions posed. We previously proposed epistemological flexibility in osteopathic care as the capacity to navigate Western and non-Western worldviews while remaining responsive to patients' sociocultural representations of the body, values and expectations [1]. More recently, « epistemic flexibility » has been described as the situated coordination of scientific, pragmatic, and operational knowledge in clinical practice [2]. Moving beyond this binary terminology, we propose epistemological flexibility as the capacity to navigate an ecology of knowledge across a spectrum of naturalist and relational conceptions of personhood and health, while matching questions with appropriate domains of inquiry and methods [3].

Osteopathy has critically reassessed several traditional models in response to biomedical science and evidence-based practice. In Europe, this has accompanied the academization of osteopathic education and research within healthcare systems, where osteopathy, unlike osteopathic medicine in the United States, is an allied health profession. Concerns about unsupported or pseudoscientific claims reinforce critical appraisal but also raise a deeper question: What constitutes legitimate knowledge, and according to which criteria? Thomson and Martini distinguish scientific knowledge from tacit, personal, and professional knowledge in osteopathic practice while maintaining that scientific claims must conform to established scientific standards [4]. This distinction is important when separating empirical claims from broader conceptual questions. Scientific methods can determine whether biological mechanisms or therapeutic effects are supported by evidence; however, they do not establish whether dominant healthcare frameworks are sufficient to investigate different representations of personhood, health, and care. This is particularly relevant to holism, whole-person healthcare, and the Body–Mind–Spirit (BMS) osteopathic tenet [5].

Knowledge production and its historical hierarchies

Biomedical sciences provide indispensable methods for investigating anatomy, physiology, pathology, disease mechanisms, and therapeutic interventions. However, health and healthcare also encompass lived experiences, meaning, interpersonal relationships, and culturally situated representations of the body, health, and illness, which constitute established fields of investigation in medical anthropology and other social sciences [6, 7]. Knowledge traditions have not developed in historically neutral environments. European colonial expansion involved political domination and hierarchies among cultures and knowledge systems. Decolonial scholarship has examined how European epistemological traditions acquired institutional authority, while others were marginalized, displaced, or recognized only after translation into categories acceptable to dominant institutions [8, 9]. De Sousa Santos (2007) termed « epistemicide » the destruction or systematic marginalization of knowledge excluded from a dominant epistemological order [3].

Recognizing these hierarchies implies neither rejecting Western science nor considering all knowledge claims to be equally valid. Biological mechanisms, therapeutic effectiveness, and safety remain empirical questions that require appropriate scientific methods. Epistemological flexibility, on the other hand, requires distinguishing the question, domain of inquiry, and methods appropriate to it. This is consistent with de Sousa Santos' ecology of knowledge [3], in which forms of knowledge coexist without assumed equivalence, and pluralist positions hold that multiple systems of practice can be scientifically productive without abandoning critical standards [9].

From epistemological plurality to relational perspectives

Rather than opposing Western and non-Western epistemologies as homogeneous categories, conceptions of personhood and health can be situated along a spectrum from predominantly naturalist and individual-centered positions to more relational positions. These positions are neither mutually exclusive nor fixed; patients and practitioners may draw on different frameworks to varying degrees, depending on the context (Figure). Indigenous epistemologies provide important examples of relational positions within this spectrum and traditions that have been historically marginalized through colonial processes. There is no universal Indigenous epistemology or single conception of health in Indigenous cultures. Nevertheless, Indigenous scholarship documents relational understandings involving the person, family, community, culture, land, natural environment, and, in some traditions, spiritual dimensions [10]. Rather than independent variables added to an individual biological model, these may reflect different representations of personhood, health, and well-being. Indigenous scholars have

articulated this relationality through relational accountability [9, 10]. Relational epistemologies are not exclusive to Indigenous traditions; related positions exist within phenomenology, medical anthropology, and cognitive sciences. Nevertheless, a broader relational framing should preserve the specificity of Indigenous peoples and their traditions. For example, Two-Eyed Seeing (Etuaptmumk) is a Mi'kmaw principle for learning through the strengths of Indigenous and Western knowledge without merging them into a single framework [11]. Their relevance to healthcare is not an alternative to the biomedical claims. Indigenous knowledge cannot establish physiological mechanisms or therapeutic effectiveness, nor should concepts be extracted from their contexts to legitimize unsupported theories or practices. Rather, they illustrate that the individual biological body is not the only epistemological starting point for conceptualizing personhood and health.



Figure. A continuum of conceptions of personhood and health: from individual-centered to relational perspectives.

From relational perspectives to the Body–Mind–Spirit osteopathic tenet

This continuum of conceptions of personhood, the body, and health provides a useful framework for situating BMS, a core tenet of contemporary osteopathic medicine, the meaning and clinical relevance of which remain insufficiently defined [5]. Historical materials document that A.T. Still lived and worked among Shawnee communities and was familiar with aspects of Native American culture and healing traditions [12]. This establishes that osteopathy did not derive from Native American medicine and did not have a direct or exclusive Indigenous origin. Still's thinking reflected multiple medical, philosophical, religious, and cultural influences on the disease. Within these limitations, our previous research suggested that Native American healing traditions may have contributed to the conception of BMS [12]. Contemporary interpretations of BMS depend on conceptions of the relationships between the body, mind, consciousness, and spirit, ranging from materialist and reductionist to non-reductive and non-materialist perspectives [13]. Descola (2013) distinguished animism, totemism, analogism, and naturalism according to the continuities or discontinuities of physicality and interiority between humans and nonhumans. Naturalism, which assumes shared physicality but distinctly human interiority, underpins much of modern biomedicine and is therefore one ontology rather than a neutral perspective [14]. In Descola's framework, physicality refers to the material and bodily characteristics of beings, whereas interiority refers to their inner attributes. This distinction broadly parallels the separation between Body and Mind–Spirit in the osteopathic tenet. However, the relationship between these dimensions can be understood differently depending on the underlying conception of the individual. Some perspectives consider them distinct dimensions that can be studied separately, whereas more relational perspectives emphasize their interdependence. This may help explain why the BMS can be difficult to conceptualize and operationalize when its different dimensions are considered separately. Epistemological flexibility provides a way to consider these different interpretations without reducing the BMS to a single conception of the person.

From Body–Mind–Spirit to epistemological flexibility in whole-person healthcare

Such a perspective may clarify the meaning of whole-person healthcare today. Between condescending skepticism that dismisses unfamiliar perspectives as « pseudoscience », « folklore », or « mythology » and conversely, romanticization of Indigenous knowledge or historical reconstructions that resist critical scrutiny, scientific inquiry should remain able to explore relevant fields critically. Several perspectives have been investigated within established scientific fields. Enactive and embodied approaches in cognitive science, for example, understand mind and personhood as emerging through interactions between the body, other people, and the environment, including through processes described as participatory sense-making [15]. These approaches have already been proposed as integrative frameworks for osteopathic care [16]. They therefore provide an example of how relational conceptions of personhood can be investigated scientifically and considered in relation to osteopathic care. This may broaden current approaches to osteopathic care, which remain largely focused on musculoskeletal conditions and biopsychosocial frameworks also used across other healthcare professions. In this context, the BMS tenet should not be considered a universal explanatory model, nor does it imply that spiritual, cultural, or existential dimensions must be addressed in every consultation. Rather, its contemporary relevance may lie in providing a framework for considering these dimensions when they are meaningful to individual patients, without treating them as explanations for biological mechanisms. The role of touch provides a clear example, as the body encountered clinically is simultaneously biological, perceptual, and lived experience. Touch involves anatomical structures and physiological processes within an interpersonal and culturally situated clinical context [2]. Research across healthcare professions has investigated touch in relation to communication, professional boundaries, therapeutic relationships, and patients' experiences of care [17].

In conclusion, different domains of inquiry require methods that are appropriate for the questions being investigated. Research on patients' experiences does not establish biological mechanisms or therapeutic effects, just as physiological evidence does not establish the meaning of an experience for an individual. Epistemological flexibility does not imply a return to historical doctrines or a departure from evidence-based practices. Unsupported biological or therapeutic claims cannot be justified using other epistemological frameworks. In osteopathic care, epistemological flexibility requires the identification of the domain of a clinical or research question, recognition of its epistemological assumptions, selection of appropriate methods, and delimitation of the inferences that they support (Table). This allows for the investigation of holism, whole-person care, and BMS without forcing them into biomedical explanations or placing them beyond critical investigations.

Domain of inquiry	Illustrative question in osteopathic care	Relevant methodological approaches	Scope and limits of inference
Biological / physiological	Does manual intervention modify specific tissue properties or physiological processes, such as autonomic activity?	Experimental studies; physiological measurement; laboratory and translational research	Identifying a physiological change does not, by itself, establish a causal therapeutic mechanism, clinical effectiveness, or its relevance to an individual patient
Clinical effectiveness and safety	Does osteopathic care improve pain, function, or other patient-relevant outcomes, and what adverse events are associated with care?	Randomized and pragmatic controlled trials; prospective observational studies; systematic reviews and meta analyses; safety surveillance	Clinical effectiveness and safety require direct empirical evaluation and cannot be inferred from biological plausibility, theoretical coherence, practitioner experience, or historical use
Experiential / phenomenological	How do patients experience touch, bodily sensations, changes in body perception, and therapeutic relationships during care?	Qualitative research; phenomenological inquiry; interpretive methodologies; patient reported experience research	These approaches investigate the lived experiences, perceptions, and meanings. Their findings do not, by themselves, establish biological mechanisms or causal therapeutic effects
Sociocultural / relational	How do patients' and practitioners' representations of the body, health, illness, and care influence clinical encounters?	Medical anthropology; ethnography; qualitative and participatory research	Representations and meanings are socially and culturally contextualized. Findings should not be generalized from predefined cultural categories to individual patients or practitioners, nor interpreted as evidence of biological mechanisms or clinical effectiveness
Epistemological plurality	How do different ways of knowing and understanding the body, health, illness, relationships, and environment, including those described within Indigenous knowledge systems, shape the interpretation of health and care by patients and practitioners?	Medical anthropology; ethnography; cross cultural and comparative research; participatory approaches; Indigenous and community led methodologies where relevant	Epistemological orientations should not be reduced to a binary opposition between Western and non-Western knowledge. Patients and practitioners may draw on multiple, overlapping frameworks to different degrees and according to context. These perspectives can inform understanding of health and care but do not, without appropriate empirical investigation, establish biological mechanisms, effectiveness, or safety

Table. Aligning clinical and research questions with domains of inquiry and methodological approaches: an illustrative framework for epistemological flexibility in osteopathic care.



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From magical touch to hands of knowledge:

How can manual therapy remodel tissues?

Text: Anette Aalto



Many manual therapists recognize the situation: tissue softens during treatment, and the client's pain is alleviated within just a few minutes. However, this is not merely a neural or fluid-circulatory effect. Responses in the local connective tissue and at the cellular level are initiated simultaneously. A mechanical stimulus is converted into a biochemical signal that regulates, among other things, cellular behaviour, collagen production and degradation, and tissue reorganization. This phenomenon is called mechanotransduction.

Understanding mechanotransduction helps not only to explain the effects of treatment but also to dose loading so that tissue becomes stronger rather than stiffer. The phenomenon is described in many ways in everyday practice, but its explanation often remains imprecise. What actually happens in tissue when pressure, stretching, traction, or rhythmic movement is applied to it?

Touch does not remain at the surface but initiates a tissue response

Manual therapy produces responses in several systems and at several levels simultaneously [1]. Connective tissue is active, physiologically functioning system that responds sensitively to mechanical stimuli. When mechanical force is applied to tissue, cells sense these forces through mechanoreceptors on the cell membrane and transduce it from mechanical to biochemical, thus the word mechanotransduction, which can be then further relayed into cell´s cytoplasm and nucleus [2, 3]. Mechanotransductive events occur continuously in our bodies: blood flowing through our vessels generates both flow-induced shear stress and hydrostatic pressure, which act on the endothelial cells lining the inner surfaces of blood vessels. Tensile force, in turn, acts on all fluid-filled structures in our bodies (e.g. urinary bladder, intestine, pericardium). The force arising from connective tissue stiffness affects all cells in our bodies, either directly or indirectly [2, 3]. The mechanical forces involved in physiological mechanotransduction can be surprisingly small. For example, endothelial cells respond to fluid shear stresses as low as 0.5–1 pascal through Piezo1-mediated calcium signaling [5]. A load equivalent to five grams (approx. the weight of a 20-cent coin) generates an average pressure of 490 pascals over 1 cm^2, but only about 5 pascals when distributed over 100 cm^2 (an illustrative palm-sized area). Although externally applied pressure cannot be directly equated with fluid shear stress, this illustrates how mechanical stress depends on the area over which a force is distributed.

Physiological movements, including respiration and vascular pulsations, as

well as touch and vibration, can generate stimuli that interact with mechanosensitive structures [3, 4]. Whether gentle manual therapy activates mechanotransduction in deeper tissues depends on force transmission and the resulting cellular deformation. Cellular responses are influenced by the magnitude, direction, duration and frequency of mechanical loading, as well as the properties of the surrounding extracellular matrix [3, 4].

The collagen network of connective tissue communicates continuously with the intracellular actin network, maintaining both intracellular and extracellular tension, or tensegrity [6, 7]. Because cellular well-being is directly proportional to the well-being and homeostasis of connective tissue and the fluids within, cells use considerable resources and energy to maintain their tensegrity. The assembly and degradation of both actin and collagen are regulated by numerous different proteins and mechanisms [8, 9].

The actin cytoskeleton serves as a central mediator of force transmission from cell membrane to cell nucleus. Through this pathway, a mechanical stimulus can alter cellular activity by the means of gene expression (transcription), protein production (translation) and secretion. In practice, this means that manual treatment does not affect only the feel of tissue, but may regulate, for example, the production and breakdown of collagen protein, cellular re-organization, and the activity of inflammatory mediators [3, 2, 1, 10].

Because cells continuously interact with their surroundings, a relatively small and localized mechanical stimulus can initiate a broader biological response. The physiological interplay between fascia, the extracellular matrix, and mechanical communication provide compelling evidence of the connection between manual therapy and cell biology [11].

Collagen production and degradation begin simultaneously

When tissue is subjected to mechanical loading, fibroblasts are rapidly activated. They begin to modify their environment by increasing collagen production, thereby strengthening connective tissue structure. However, this process is not unidirectional. At the same time, the transcription and translation of collagen degrading proteins, such as matrix metalloproteinases (MMP enzymes), is also initiated [3, 12] (Fig. 1).

In practice, tissue enters a state in which construction and breakdown of collagen occur in parallel. At an early stage, within hours of loading, MMP enzymes and other factors enable the breakdown of old or damaged structures. Thereafter, collagen protein production intensifies and typically reaches its peak within approximately 24–48 hours. After two days (48–72 h), connective tissue continues to reorganize so that it can better respond to the loads imposed upon it [3, 13, 14] (Fig. 1). This bidirectional response is also central from the perspective of manual therapy. Tissue softening observed during treatment is associated with a nervous system response and rapid cellular secretory pathways, whereas longer-term changes are based on cell-directed collagen production and tissue remodeling [10, 12].

> "When magical hands are replaced by an understanding of tissue biology, the work of the manual therapist becomes more precise.

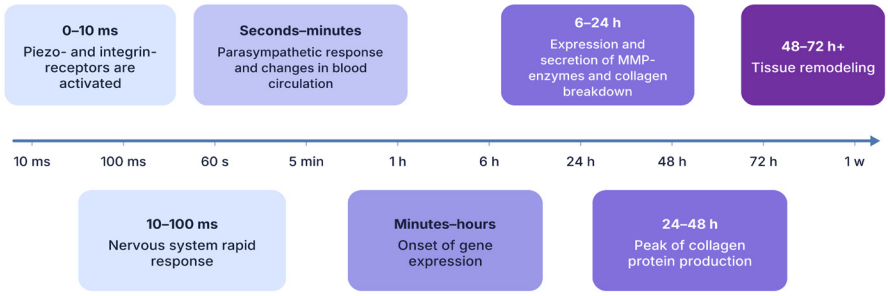


Figure 1. Timeline of mechanotransductive responses following osteopathic manual treatment.

Mechanical tissue stimulation initiates rapid receptor activation and neural responses (milliseconds to minutes), followed by changes in gene expression (minutes to hours), extracellular matrix degradation (6–24 h), collagen synthesis (24–48 h), and tissue remodeling (48–72 h and beyond).

Why are the effects felt within minutes?

Although structural tissue remodeling takes hours and days, the effects of manual therapy are often felt within just a few minutes. This rapid response is explained primarily through the nervous system [15, 1]. When the therapist treats tissue, mechanoreceptors are activated and send signals to the central nervous system. Consequently, the processing of pain signals may change: pain is alleviated, muscle tension decreases, and tissue feels softer on palpation [15, 1, 16].

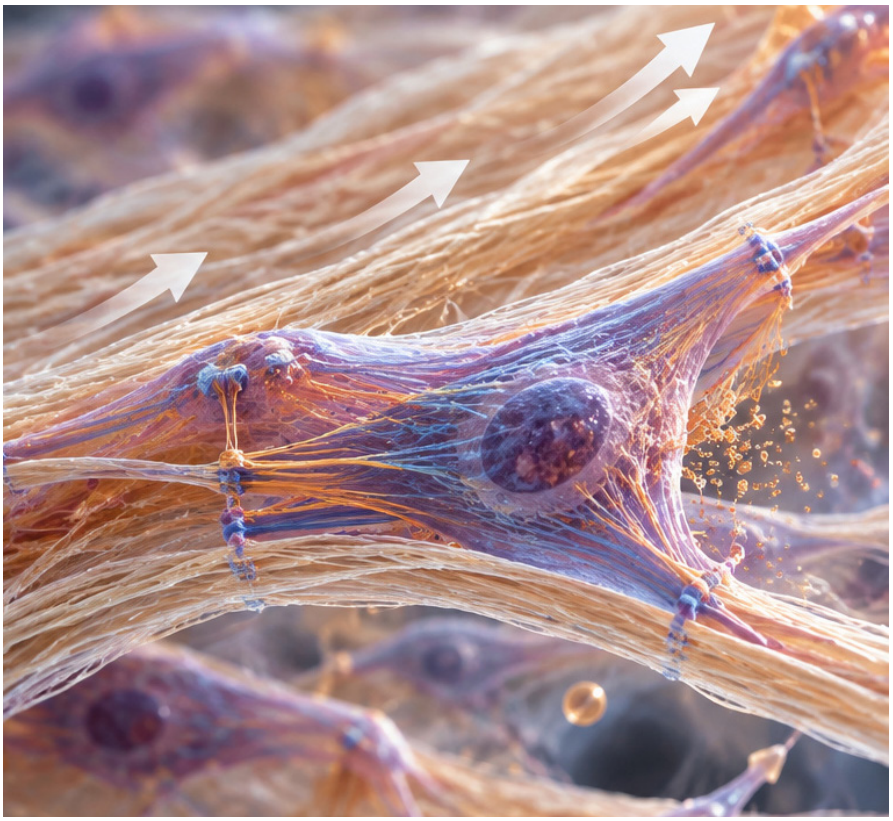
Piezo2 mechanoreceptors are calcium channels in the cell membrane that open rapidly when exposed to light touch, pressure, or vibration. The rapid influx of calcium causes neurons to send action potentials to spinal cord, which is interpreted as touch in our sensory cortex. Because these reactions and their responses back to the tissue are extremely rapid and involve the entire body rather than only the manually treated area, they are known as organism-level mechanotransduction events. The cell responds immediately to an external force and forwards a message either through the cell membrane (e.g. action potential) or by secreting something into its extracellular environment (e.g. interleukin) or directly into a neighboring cell (e.g., nitric oxide). Although these examples also demonstrate that several biological responses have already been identified in connection with manual therapy, their direct relationship to long-term clinical outcomes is not yet sufficiently understood [1].

A delayed response: Local connective tissue changes occur within one to three days

A rapid change does not mean that tissue has already undergone a permanent structural change. Rather, it represents nervous system-mediated regulation that may create the conditions for subsequent, slower tissue changes. This is also an important consideration in treatment planning: immediate relief alone does not indicate long-term tissue adaptation [1].

The temporal dynamics of mechanotransduction help explain this distinction. The conversion of mechanical force into a biochemical response occurs within milliseconds or seconds through cell-surface receptors, ion channels (e.g. Piezo channels), and the cytoskeleton (e.g. actin). This is followed by early signaling reactions and calcium-mediated events, which are activated within seconds or minutes. Changes at the gene level take minutes to hours, while actual collagen synthesis and secretion of connective tissue-remodeling enzymes develop over hours and days [20, 13, 14] (Fig. 1). This means that although a therapeutic effect may be palpable within a couple of minutes, a longer biological process is initiated in the background and continues after treatment.

From a clinical perspective, this temporal layering is essential. For example, in trigger point inhibition, pressure is often applied to tissue for 30–90 seconds,



Conceptual illustration of mechanotransduction – how mechanical stimulation of tissue can be converted into biochemical signals that influence cellular activity, collagen remodeling, and connective tissue remodeling. (Image made using AI)

and the mechanism of action it activates is largely neural and related to muscle cell metabolism [19]. On the other hand, static pressure alone, without tissue stretching, does not appear to consistently increase collagen production [20]. Tissue stretching activates fibroblast Piezo channels and induces cell differentiation, collagen and MMP enzyme production, and cell migration [21]. This emphasizes that the manual therapist must be able to select the magnitude, quality, direction, duration, and rhythm of pressure according to the tissue's initial condition and the stage of its healing process.

The dosage, quality and timing of loading determine the direction of treatment

Tissue continuously strives for homeostasis. Mechanical loading is a central part of this regulation: when appropriately dosed, it guides tissue to renew and strengthen itself, but when excessive, it can become counterproductive. This is particularly evident in connective tissue, where fibroblast activation increases collagen production. If loading is continuous or excessively intense, too much collagen begins to accumulate and tissue becomes stiffer [3, 12]. At present, there is no medication that breaks down scar tissue that has already formed. Manual therapists can however administer an appropriate amount of correctly timed manual therapy "medicine" to the tissue in need and wait for the cells to do the work. This is what we osteopaths do the best: we support the body so that the organism has an opportunity to restore its state of homeostasis.

From the perspective of manual therapy, what matters is therefore not only what is done, but how much and how often [1]. Treatment should act as a mechanical stimulus that guides tissue towards a more functional structure. Repeated stimulation strengthens neural pathways (e.g. giving the brain novel afferent input via limb or vertebra) and modifies ECM stiffness mounting to lasting changes in both nervous tissue and connective tissue levels.

Conclusion

When magical hands are replaced by an understanding of tissue biology, the work of the manual therapist becomes more precise. It is no longer simply a matter of performing techniques, but of guiding loading appropriately. This is a central step toward more effective and better justified manual therapy.



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Where the consultation begins: conversational AI and the osteopathic case history

Text: Daniel Heed

Introduction

Most osteopathic consultations begin by finding out what matters. We ask questions, listen for patterns, and try to understand the person in front of us: How long have you had the pain? What makes it worse? How are you sleeping? Have you had this before? These are not small questions. They are the start of clinical reasoning. But they also take time, and some of the routine information could perhaps be gathered before the patient walks into the room.

Now picture a different opening. The evening before the appointment, a patient with persistent neck pain receives a link. Instead of completing a paper intake form, they work through a structured conversation with a digital assistant. The assistant asks about pain history, sleep, activity, medication and what the patient is hoping to get out of the visit. A few standardised outcome measures may also be included. By the next morning, the osteopath opens a short summary. The consultation does not start from a blank page. It starts from something that already needs interpretation.

For osteopaths, this is no longer just a thought experiment. Conversational artificial intelligence (AI), including chatbots, voice-based systems and virtual agents, is already being studied in healthcare for patient support, screening, symptom monitoring and the administration of clinical assessment instruments [1-4]. This raises a practical question for our profession: if patient information is gathered by an AI tool before the appointment, are we getting the same assessment in a different format, or does the format change the interaction itself?

This article draws on a scoping review I carried out as part of my master's thesis in eHealth at Linnaeus University. The review explored conversational AI for administering clinical assessment instruments and other forms of structured health data collection. My aim here is to pull out the parts that matter most for osteopathic practice, where the case history, the patient's context and their own account of the problem sit at the centre of how we reason.



Clinical reflection 1
When a questionnaire becomes a conversation

A dialogue-based interface can make data collection easier and more engaging. But it is not simply a wrapper around the same questions. Before relying on AI-collected data, it is worth asking: who or what asked the questions, was the instrument validated in this format, and could the format have biased or shaped the patient's answers?

Methods

I conducted a scoping review to map how conversational AI has been studied in relation to clinical assessment instruments and structured health data collection. Searches in PubMed and Scopus, complemented by manual searching, identified fifteen empirical studies. The studies ranged from chatbots delivering established instruments to broader uses such as screening, symptom follow-up and self-management support.

I organised the findings around three dimensions: data quality and measurement validity, usability, and acceptance. These are easy to confuse in practice. Validity asks whether the information can be trusted for the purpose at hand. Usability asks whether people can use the system without unnecessary friction. Acceptance asks whether patients and clinicians are willing to use it in a real care setting. A tool can perform well in one of these areas and still be weak in another.

Results

Three findings stand out as relevant for osteopathic clinicians.

First, who asks the question - and how it is asked - can change what you get back. Turning a questionnaire into a dialogue does more than change the packaging. The interaction can shape how a patient understands a question and how they choose to answer it. Text, voice, an on-screen avatar and the sense that something is 'listening' have all been reported to affect response patterns, disclosure of sensitive information, completion time and perceived burden [5-7]. For anyone who relies on patient-reported information, that should give pause. Osteopathic history-taking was never pure fact collection; much of it is about context - how someone sleeps,

what they believe is wrong, what they fear, what has happened in earlier care - and that layer may be sensitive to how questions are put.

Second, a good experience is not the same as a good measurement. Several studies described conversational systems that patients found accessible, engaging or easy to use. But a positive experience did not reliably translate into faster completion, lower burden, cleaner data or greater clinical value. In one comparison, patients preferred a conversational agent over a conventional online form even though the chatbot took longer to complete [8]. The takeaway is slightly unglamorous but important: how much a patient likes a tool tells us very little, on its own, about whether its output is worth acting on.

Third, acceptance rests on more than the technology working. Across the studies, willingness to use these systems depended on perceived usefulness, trust, privacy, the sensitivity of the topic and the setting in which the system was used [8-10]. Patients do not accept an AI-supported assessment simply because it functions. It has to feel safe, relevant and worth their time. In osteopathy, where so much depends on the clinician-patient relationship, I would expect that bar to sit higher rather than lower.

Clinical reflection 2
Better experience, worse measurement?

A patient may prefer a chatbot because it feels personal and easy. That preference does not tell you whether the data are valid, whether the assessment is quicker, or whether the result is useful once it reaches the clinic.

Discussion

For now, the most realistic use of conversational AI in osteopathic practice may be preparation rather than diagnosis or treatment planning. A digital assistant could gather selected parts of the case history before the visit, guide the patient through outcome measures and flag areas that deserve follow-up. Take the patient with persistent neck pain: a pre-consultation conversation might surface poor sleep, avoidance of movement, high stress or previous healthcare experiences that shape expectations. As the clinician, you still examine the patient, judge what is relevant and decide what to do. What changes is the starting point.

There is real upside here. Less time spent collecting basic information may create more room for the parts that genuinely need a clinician: meaning, priorities, examination and reasoning. Patients get a chance to reflect before they arrive. Short digital check-ins between appointments could also help track symptoms, function and whether treatment goals are actually being met.

The risks deserve equal attention. Clinical instruments are usually built and validated in a particular format. Moving one into a chat window, voice interface or avatar-led conversation may shift its measurement properties in ways we would not necessarily notice. If AI-collected information is going to inform clinical decisions, both the instrument and the system need to be validated for that use, rather than assumed to carry over from the paper or web version. Responsibility also has to stay clear: a tool can collect and organise information, but it cannot take responsibility for interpretation.

So the useful question for osteopaths is not whether AI can replace the case history. It is which parts of information gathering can safely be structured before the consultation, and which parts need to happen in the room, between two people. Getting that line right helps us avoid both hype and reflexive suspicion. I do not think conversational AI belongs at the core of osteopathic reasoning. But as a way to prepare and extend the clinical conversation, it may well earn a place.

Osteopathic scenario - The complex first visit

A patient arrives with long-standing low back pain. A digital conversation the night before has already highlighted poor sleep, high stress, reduced activity and previous healthcare experiences that may affect trust and expectations. The AI has not made an osteopathic assessment. It has given the clinician a structured place to start reasoning from.

Before you bring one of these tools into the clinic

1. What is the system collecting, and for what purpose?

2. Is a validated instrument being altered by the conversational format?

3. How are privacy, consent and data storage handled?

4. Who reviews the information before it shapes a clinical decision?

5. Does the tool support the clinician-patient encounter, or quietly stand in for it?

Conclusion

Conversational AI may move the starting line of the osteopathic consultation. Parts of the case history, patient-reported outcomes and contextual assessment could increasingly happen before the patient sits down in front of us. That does not shrink the osteopath's role. If anything, the easier data become to collect, the more the work shifts towards interpretation: working out what the information actually means for this person, with this body and this history. The consultation may start before the appointment. The judgement it exists to serve has not gone anywhere.

Declaration of interest

The author is co-founder of Elevyo Health AB, the Swedish health-tech company behind Healthfinder, a digital tool for structured health and lifestyle assessment. This article draws on an independent master's thesis in eHealth.



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Osteopathic treatment in rehabilitation after caesarean section: a narrative review

Text: Grgur Kovačić

Introduction

Caesarean section is among the most common operations worldwide. The global rate rose from 7 per cent in 1990 to 19 per cent in 2014, and several high-income regions now exceed 30 per cent [1]; the Nordic countries remain at 14–20 per cent [2]. These figures exceed the 10–15 per cent that the World Health Organization historically regarded as justified; WHO now says only that rates above 10 per cent bring no further reduction in maternal or newborn mortality [3]. Between 11 and 17 per cent of women report persistent scar pain 3 to 12 months later [4], and a quarter report chronic post-surgical pain of any kind at three months [5]. Abdominal wall structure is altered years afterwards – thinner rectus abdominis, wider inter-recti distance and thicker perimuscular fascia on ultrasound [6]. The incision through skin, fascia, rectus sheath, peritoneum and uterus leaves scar tissue and adhesions [7] that may restrict fascial gliding and visceral mobility [6,8]. Pregnancy itself – a shifted centre of gravity, increased lumbar lordosis and ligamentous laxity [9] – already gives almost two-thirds of women lumbopelvic pain [10].

Where structured postoperative care exists, it usually focuses on early mobilisation and strengthening; deep fascial, visceral and scar-related dysfunction is rarely addressed systematically. Osteopathy, with its focus on structure–function relationships, tissue mobility and fluid dynamics, offers a framework for these problems, and gentle perinatal touch has a plausible neurophysiological rationale [11]. This review summarises the evidence for osteopathic treatment after caesarean section, the proposed mechanisms, and where the evidence remains limited.

Methods

This narrative review uses thematic synthesis of the evidence, reported in line with the SANRA guidance [12]. A narrative design was chosen because the question spans effects, mechanisms, safety and limitations, and much osteopathic research sits outside the main biomedical databases.

PubMed/MEDLINE, Scopus and the Cochrane Library were searched alongside the osteopathic repositories OSTMED.DR, the COME Collaboration Database, the Osteopathic Research Web and the European Journal of Osteopathic Research, combining terms for osteopathic or manual treatment, caesarean section, scar, adhesions and postpartum pain, with no date or language limits.

Eligible studies included women after caesarean section, during pregnancy or postnatally, or general postoperative populations offering transferable mechanistic or clinical insight; all designs were considered, from RCTs and systematic reviews to pilot studies, case reports and qualitative work. Outcomes of interest were pain, function, scar quality, tissue mobility, recovery, quality of life and safety.

Results

Scar quality

The most consistent evidence comes from studies of scar mobilisation. In a proof-of-concept study of 32 women, two sessions of standardised scar mobilisation immediately increased elasticity, reduced measured stiffness and raised pressure pain thresholds [13]. Outcomes were measured immediately after treatment, indicating a short-term viscoelastic response rather than lasting remodelling. A small randomised study (15 treated, 15 untreated) of 12 sessions over four weeks found significant improvements in scar vascularity, pigmentation, pliability, height and texture, and less pain and stiffness at the end of the programme [14]. A pilot study of 12 scars of mixed origin, mostly abdominal, found a more homogeneous thermal response after a single osteopathic treatment, interpreted as a change in connective-tissue function [15]. A four-case report describes osteopathic treatment integrated into caesarean care [16].

Adhesions and chronic lumbopelvic pain

In a pilot RCT of 34 women with chronic low back pain after caesarean section, two 30-minute sessions of an osteopathic adhesion protocol (visceral mobilisation and myofascial release) reduced pain by 2.6 points on the numeric rating scale and decreased the Oswestry Disability Index from 18.3 to 6.2 per cent. Compared with physiotherapy, the difference in disability was significant, whereas the larger reduction in pain was not, and the treating assessor was unblinded [17]. The only RCT in chronic post-caesarean pain (n = 28) compared four sessions of superficial abdominal massage and skin rolling with the same plus deep scar mobilisation and myofascial release: pain, pressure pain thresholds, disability and scar mobility improved equally in both groups, so the deeper techniques added nothing [18]. In an uncontrolled series of 59 postpartum inpatients, one 25-minute bedside session reduced visual analogue scale pain from 5.0 to 2.9 immediately afterwards, similarly after caesarean and vaginal birth [19]. A systematic review of eight RCTs (about 850 women, five of them unpublished theses) found medium-sized effects on low back and pelvic girdle pain during and after pregnancy, significant against untreated or usual-care controls but not in the two trials with a sham comparison [20].

Gastrointestinal recovery

In a small retrospective cohort of general surgical patients (17 treated, 38 untreated), osteopathic treatment (cranial, myofascial and muscle energy techniques) within 48 hours of surgery was associated with a shorter time to first flatus (3.1 versus 4.7 days) and hospital stay (6.1 versus 11.5 days) [21]. A 2024 scoping review of 30 studies identified reduced pain and faster return of bowel function as the most consistent postoperative outcomes [22].

Proposed mechanisms

The best-supported hypothesis is that gentle touch activates C-tactile afferents that modulate pain perception and

autonomic balance [11]. In vitro, strain modelled on manual therapy reduces strain-induced IL-6 and IL-8 release by dermal fibroblasts and, in modelled myofascial release, alters proliferation and accelerates wound closure [23,24]; whether this translates into remodelling of scar matrix in vivo is unknown. In rat models of peritoneal injury, gentle daily abdominal mobilisation from the first postoperative day markedly reduced adhesion formation (6 of 15 treated versus 20 of 20 untreated rats in one study) and shifted macrophage phenotype, whereas treatment of established adhesions was less effective [25,26]; no human trial has tested early mobilisation after caesarean section against adhesion formation. Because manual forces are far too small to deform dense fascia plastically [27], immediate changes in stiffness are best explained by neural regulation of tone and fibroblast-mediated changes in tissue tension rather than by mechanical "release". Visceral techniques are proposed to reduce traction on the lumbar spine by restoring organ mobility [28], but this remains a clinical hypothesis without direct experimental support (Table 1).



Table 1. Selected studies of osteopathic and manual treatment after caesarean section and in perinatal care.

Theme	Study	Design/population	Intervention	Main findings
Scar	Gilbert et al. 2022 [13]	Proof-of-concept, uncontrolled; n = 32 post-caesarean	2 sessions standardised scar mobilisation	2 sessions standardised scar mobilisation Immediate ↓ stiffness, ↑ elasticity, ↑ PPT
Scar	Olszewska et al. 2024 [14]	Small randomised study vs no intervention; 15 + 15	12 sessions over 4 weeks, 8 techniques	Improved vascularity, pigmentation, pliability, texture; less pain
Adhesions / chronic pain	Liedler & Woisetschläger 2019 [17]	Pilot RCT; n = 34, chronic LBP after caesarean	2 × 30 min adhesion protocol (MFR, visceral) vs physiotherapy	NRS −2.6 (n.s. vs control); ODI 18.3 % → 6.2 % (significant)
Chronic post-caesarean pain	Wasserman et al. 2018 [18]	RCT; n = 28	4 sessions superficial massage ± deep scar mobilisation and MFR	Pain, PPT, ODI and scar mobility improved equally; no added benefit of deep techniques
Acute postpartum pain	Hastings et al. 2016 [19]	Uncontrolled series; n = 59 postpartum	One ~25-min bedside session	VAS 5.0 → 2.9 immediately after; similar after caesarean and vaginal birth
Lumbopelvic pain	Franke et al. 2017 [20]	Meta-analysis; 8 RCTs, ≈ 850 women	OMT (MFR, ME, HVLA)	Medium effect vs untreated / usual care; not significant vs sham
Postoperative recovery	Baltazar et al. 2013 [21]	Retrospective cohort; general surgery, 17 vs 38	OMT within 48 h (cranial, MFR, ME)	Flatus 3.1 vs 4.7 days; stay 6.1 vs 11.5 days
Postoperative recovery	Randall et al. 2024 [22]	Scoping review; 30 studies	MFR, ME, visceral techniques	Less pain, faster bowel recovery, shorter stay

LBP – low back pain; MFR – myofascial release; ME – muscle energy; HVLA – high-velocity low-amplitude; OMT – osteopathic manipulative treatment; PPT – pressure pain threshold; NRS – numeric rating scale; ODI – Oswestry Disability Index; VAS – visual analogue scale; n.s. – not significant.

Discussion

The literature suggests that osteopathic treatment can influence scar quality, pain and disability, lumbopelvic function and the return of gastrointestinal motility. The clearest signal comes from scar mobilisation, where two to twelve sessions produced measurable change [13,14]; the findings on adhesion-directed treatment [17,18] and bowel recovery [21,22] point to effects beyond the local tissue.

This aligns with qualitative research in which women describe complementary hands-on care, including osteopathy, as helping them reclaim a body that felt "cut in two" [29], and with the neurophysiology of gentle touch, which shifts autonomic balance towards parasympathetic tone and modulates central pain processing [11]. The Enhanced Recovery After Surgery (ERAS) guidelines for postoperative care after caesarean delivery emphasise early mobilisation, early feeding and multimodal analgesia [30]; osteopathic treatment is a natural fit for such a pathway.

For the practising osteopath, these studies are close to everyday practice: myofascial release, muscle energy, visceral mobilisation and direct scar mobilisation are standard repertoire, and doses were modest, from one session to twelve over four weeks. The picture that emerges is phased and gentle. In the first days after surgery, light treatment aimed at autonomic balance and bowel function – also the window in which animal data suggest adhesion formation can be influenced [25,26]. Once the wound has healed, work on the scar, abdominal wall and underlying viscera, remembering that deeper techniques added nothing in the one trial that tested them [18] and that excessive mechanical stimulation of immature or pathological scars may increase neurogenic inflammation and fibrosis [31]. In the months that follow, attention to lumbopelvic function alongside evidence-based physiotherapy and pelvic floor training. On this evidence, a postnatal assessment that omits the scar and the tissues beneath it is incomplete.

The evidence is thin, however. A review of osteopathic journals 1990–2017 found only ten studies in surgical care, with 8 to 331 participants and marked heterogeneity in techniques, dose and provider experience [32]. Caesarean-specific data come from small uncontrolled series [15,16,19,33] and three small randomised trials [14,17,18]; follow-up ranged from one to ten weeks, and the only active comparators were physiotherapy [17] and superficial massage [18]. Elsewhere, controls are mostly untreated or usual-care groups, so trials show that treatment beats no treatment, not that osteopathy beats another active intervention; and the long-term effect of scar mobilisation on scar collagen is unknown. Next, multicentre RCTs with standardised protocols, sham or active comparators, validated outcome measures (Vancouver Scar Scale, POSAS, pressure pain thresholds, ODI, NRS), and follow-up of at least twelve months are needed, alongside mechanistic studies of tactile stimulation and matrix remodelling.

Conclusion

Osteopathic treatment appears to be a safe, well-accepted and clinically promising complement to rehabilitation after caesarean section, with measurable short-term effects on scar quality, pain, tissue mobility and gastrointestinal recovery. For the clinician, the scar and the tissues beneath it deserve attention in every postnatal assessment; early treatment should be gentle, and a few sessions may make a difference. For the profession, the evidence still rests on pilot studies, small trials and cohorts; well-designed comparative trials are the next step.



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The helical biotensegrity model: beyond traditional biomechanics

Text: Tiana Newell

Introduction

Biotensegrity considers the human body as dynamic, hierarchical, and continuously adapting. The helical biotensegrity model extends beyond the traditional biomechanical framework by seeking to explain the complexity of living organisms.

Current biomechanical approaches, which remain embedded in osteopathic education and professional standards[1,2], have been argued to inadequately reflect the multiple nested systems of biological organisms[3,4]. This limited view potentially undermines the holistic philosophy central to osteopathy and the profession's identity[5,6,7,8].

This study aims to broaden the biomechanical perspective through the concept of biotensegrity. Biotensegrity describes a structural system that provides an energy-efficient solution for multidimensional biologic organisms. It recognises connective tissue as a fundamental component of the sensorimotor system rather than as a passive supporting structure[9,10,11,4].

The physical principles underlying biological tensegrity extend beyond classical Newtonian mechanics[12] by incorporating molecular and cellular mechanisms governing biological organisation and adaptation[9,10,11,4].

The potential relevance is particularly evident in sports medicine, where fascia research has been recognised for its contribution to understanding injury prevention, performance, and rehabilitation[13].

Background

Increasing numbers of researchers have questioned the mechanistic and reductionist assumptions of traditional biomechanics. Conventional biomechanical models rely on assumptions regarding biological tissues that are no longer supported by current evidence[4,5,14,15,16]. Consequently, incorporating these models into a profession founded on holistic principles may influence clinical reasoning in ways that are inconsistent with osteopathic philosophy[5,7,8].

A holistic perspective should remain central throughout osteopathic reasoning and clinical decision-making rather than shifting towards a predominantly biomedical or reductionist framework[8]. To support this, the present study proposes biotensegrity as a structural model capable of complementing and expanding traditional biomechanics.

In engineering, tensegrity refers to structures maintaining stable states of self-equilibrium through discontinuous sets of compression elements suspended within continuous networks of tension elements[17]. Most manmade structures rely primarily on gravity for stability, whereas tensegrity systems are inherently self-stabilising through distributed force transmission, retaining their structural integrity even without gravity[18].

Biotensegrity applies tensegrity principles to biological structures[18,19]. Biotensegrity addresses the complexity of living organism by recognising multiple nested and hierarchical systems operating simultaneously; molecular, cellular, organ, and whole-body systems[3,18].

Within the human body, helical organisation appears across multiple hierarchical levels. Helical "tubes within tubes" are observed at the organ-system level, including the cardiovascular and urinary systems, as well as at cellular and molecular levels, such as collagen fibers and DNA[4,11,18,20]. Collagen, the body's most abundant structural protein, surrounds virtually every cell and constitutes a major component of the extracellular matrix. Consequently, the fascial system forms a ubiquitous three-dimensional network characterised by helical organisation[4,11,14].

Within this framework, connective tissue is a vital component of the sensorimotor system[4,9,10,11]. Connective tissue may be understood as a fascial metasystem that enables the individual physiological systems to function in an integrated and coordinated manner[21].

Helical organisation and tensegrity are complementary structural principles sharing common geometric origins and providing highly energy-efficient solutions for biological systems. In molecular biology, this organisation is associated with close-packing geometry, where tensegrity structures maximise both stability and surface-to-volume ratio, properties advantageous for sustaining life[4,9,10,11].

Helical tensegrity emerges across biological organisation; embryological development, organ formation and whole-body movement. Helical movement patterns naturally arise within the closed kinematic chains of connective tissue throughout the body[4,11,14,20]. Within contemporary rehabilitation there is limited availability of movement models translating biotensegrity principles into clinically applicable macroscopic movement patterns. Within phenomenological perspective movement is regarded as primary, and anatomical form emerges from continuous and repeated motion[23]. This study approached tensegrity from the perspective of a movement therapist[22] seeking movement strategies supporting tissue health while recognising the functional role of the connective tissue matrix in posture and locomotion. The study focused specifically on tensegrity-like movement of the head.

The hypothesis was that movement patterns reflecting helical and continuous organisation would demonstrate characteristics consistent with biotensegrity principles. The study sought to generate a macro-level conceptual visual model that could facilitate future investigation of fascial-oriented movement strategies within osteopathy and related healthcare disciplines. This perspective acknowledges the connective tissue matrix as an active component of human movement, aiming to integrate current understanding of fascial continuity into practical rehabilitation[11,22].

As an exploratory qualitative study, the objective was not to establish causal relationships or validate biomechanical mechanisms, but to provide a theoretical framework to stimulate further research into the relationship between biotensegrity, fascial continuity, and human movement.

Methods

A qualitative phenomenological methodology was adopted using visual autoethnography to explore the continuous, multiplanar movement of the head. The study combined first-person embodied observation with visual analysis to investigate movement characteristics.

Continuous three-dimensional movement sequences of the head were performed and visually documented. Visual data was produced by recording the three-dimensional continuous movement of the head through all three cardinal planes. The movement sequence began with a lateral flexion to one side leading into flexion and was followed by lateral flexion to the opposite side finishing with extension, and again into a lateral flexion movement.

Still frames were captured from videos, labeled, and printed on paper. Movement trajectories of two anatomical landmarks were analysed: the highest point of the neurocranium (bregma) and the chin, representing the viscerocranium. These trajectories were observed from multiple perspectives to identify recurring movement patterns and their spatial organisation.
After analysis of the multiplanar movement pattern drawings, the trajectories of the viscerocranium and neurocranium were illustrated.

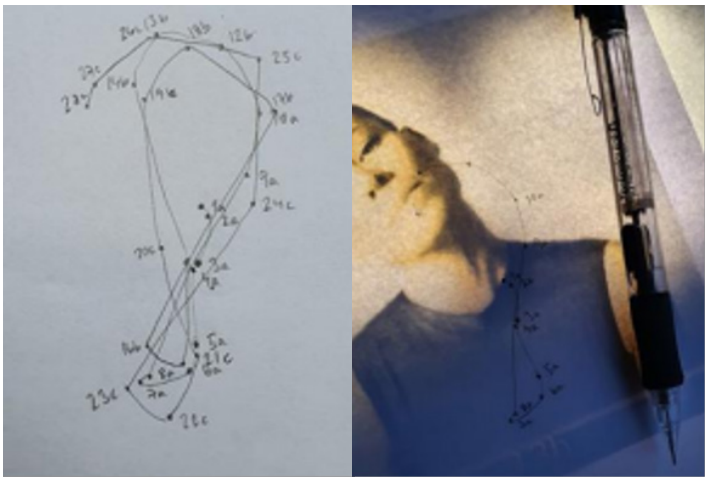

Figure 1. Visual representations of the multiplanar movement of the viscerocranium from the fronto-superior view.

Results

Visual analysis demonstrated distinct yet simultaneously emerging movement patterns for the neurocranium and the viscerocranium during continuous three-dimensional movement of the head. These findings resulted in the development of a conceptual visual model illustrating a tensegrity-like organisation of head movement. Multiplanar movement of the neurocranium was represented in the frontal, sagittal, and horizontal planes. Tracking of bregma revealed an elliptical trajectory in both frontal and sagittal planes. In the horizontal plane, movement approximated a circular pattern, reflecting the continuous and multidirectional nature of the movement sequence.

Analysis of the viscerocranium demonstrated a distinct helical organisation. Tracking the movement of the chin produced a figure-eight trajectory, with the clearest and most symmetrical pattern observed from the fronto-superior perspective. This recurring movement pattern suggested that the viscerocranium followed a helicoid pathway throughout the movement sequence.
The combined observations demonstrated that movement patterns of the neurocranium and viscerocranium were not independent but co-emerged during the same continuous movement. While the neurocranium followed a predominantly circular trajectory, the viscerocranium simultaneously expressed a helicoid movement pattern. Together, these trajectories formed a coordinated three-dimensional movement model that was interpreted as consistent with the principles of biotensegrity.



Figure 2. Helicoid movement pattern of the head[32].

The resulting model illustrates the simultaneous emergence of circular and helicoid movement during continuous three-dimensional motion of the head. This offers a visual framework for understanding helical organisation at a macroscopic level and provides a foundation for future investigation of biotensegrity-informed movement within osteopathy and other healthcare professions.

Discussion

As a phenomenological visual autoethnography involving a single researcher, these results are exploratory and cannot be generalised or interpreted as evidence of causal physiological mechanisms. The proposed model should be regarded as a conceptual hypothesis that requires further research.

By complementing traditional biomechanics, biotensegrity may broaden osteopathic clinical reasoning and encourage approaches that more closely reflect the complexity of biological systems. The findings of this study support the proposition that the biotensegrity model may offer a valuable conceptual framework for understanding human movement beyond traditional biomechanics.

While Newtonian mechanics provide an important educational foundation for analysing forces and motion, it lacks in accounting for the dynamic, adaptive, and interconnected nature of living systems. These biomechanical models often overlook the active role of the fascial metasystem, resulting in an interpretation of movement that may be overly reductionist when applied to human physiology[4,14,24].

Research continues to reveal the complexity of connective tissue organisation and the importance of the extracellular matrix in maintaining biological homeostasis[20,29,30,31]. This supports a shift from viewing fascia as passive connective tissue, to understanding it as an active biological network involved in force transmission, mechanotransduction, sensory function, and physiological regulation. Within this context, biotensegrity provides a new framework for therapeutic exercise programmes that emphasise continuity, multidirectional loading and movement variability.

Movement can be understood as a property of interconnected biological networks rather than the sum of individual joint actions. Healthy fascia requires appropriate mechanical loading, hydration, and movement variability to maintain optimal viscoelastic properties[25,26]. Movement and increased temperature stimulate tissue hydration[25] and may help improve chronic pain[27]. Controlled, continuous, multidirectional movement facilitates these processes by producing gentle and distributed strains throughout the fascial network.

Helical organisation is a recurring principle throughout biological systems, from molecular structures to organ development and whole-body movement[11,28,29]. The helical movement patterns observed in this study therefore correspond with a structural characteristic that is widely represented across biological organisation.

The model developed in this study illustrates one possible macroscopic expression of biotensegrity. A continuous three-dimensional movement of the head demonstrated the simultaneous emergence of circular and helicoid movement patterns. These coordinated trajectories provide a conceptual representation of how continuity and helicity may be expressed in whole-body movement.

The application of the helical biotensegrity model is consistent with the philosophical foundation of osteopathy, emphasising the body's intrinsic capacity for self-regulation, the interrelationship of structure and function, and the individual as an integrated functional unit[1,2].

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Osteopaths and medication-overuse headache in Danish primary care:

a survey of clinical exposure and knowledge gaps

Text: Tina Kolby
Supervisor for project: Rigmor Jensen, Danish Headache Centre.

Introduction

Medication-overuse headache (MOH) is a preventable and treatable secondary headache disorder (1–3) with a reported prevalence of 2% in Denmark (4) . Recent Nordic data from the PopHEAD study in Norway (5) indicate a substantially higher adjusted prevalence of probable MOH (pMOH) of 5.9%. MOH is defined in the ICHD-3 as headache occurring on 15 or more days per month in a patient with a pre-existing headache, resulting from regular overuse of acute or symptomatic headache medications for more than three months. This includes 10 or more days per month of combination analgesics, triptans, ergotamines or opioids, and 15 or more days per month of simple analgesics such as paracetamol or NSAIDs (2).

Although MOH represents a relatively small proportion of headache disorders, it accounts for a disproportionately high burden of Years Lived with Disability (YLD)(6), and generally improves once the overuse is discontinued (7)

Early recognition in primary care is central to prevention, yet awareness campaigns have so far focused on GPs, pharmacists and the general public (8). Headache is among the most common complaints treated by Danish osteopaths, reported by 75% in a 2023-member survey(9) , and use of complementary and alternative treatments increases with headache severity (10) Osteopaths represent a potential additional point of early recognition, but their current role, practice patterns, and knowledge base remain undocumented. A 2022 UK survey(11) assessed registered osteopaths' knowledge of headache disorders, including a MOH case vignette, and is the closest comparable international study; to our knowledge, this study is the first to focus explicitly on MOH among osteopaths.

The aim was to assess Danish osteopaths' and osteopathic students' clinical exposure to headache patients, their current documentation and referral practices, and their self-assessed competence and knowledge of MOH-specific criteria, as a needs assessment to inform future education and validation studies.

Method

A cross-sectional, anonymous online survey (15 items, Google Forms) was distributed via Facebook, newsletter and direct contact to members of Danske Osteopater (population n=414) as part of a master's thesis at the University of Copenhagen. The survey was open from November 2025 to January 2026. The questionnaire combined descriptive items on clinical exposure and practice, self-assessed competence items, and forced-choice items with objectively correct answers. 101 respondents completed the survey (24% response rate). Osteopaths (n=63) and osteopathic students with a background as Physiotherapists or an equivalent background in health science (n=38) participated. Data were analysed descriptively.

The questionnaire combined two distinct measurement approaches to headache-related knowledge, reported separately throughout this article. Self-assessed competence items (Q3–Q5) asked respondents to report their perceived ability to recognise headache phenotypes (Q3), differentiate phenotypes based on clinical history (Q4), and locate the relevant diagnostic criteria (Q5); these capture perceived, not demonstrated, competence. Objectively scored knowledge items (Q6, Q7, Q9) presented a closed set of response options with defined correct answers: recognition of medication classes associated with MOH (Q6), the recommended intake frequency of analgesics and triptans (Q7), and the threshold for initiating preventive treatment(Q9). Answers were scored against the Danish Headache Society reference programme(12) . For Q7, '<2' and '<3 days per week' were considered correct, as both remain below the recommended maximum of 9 days per month for triptans and combination analgesics. For Q9, '4 days per month' was considered correct, in line with the recommendation to consider preventive migraine treatment at ≥4 migraine days per month (12). For this article, we grouped items by measurement type to report self-assessed competence and objectively scored knowledge separately.

Item	Content	Measurement type
Q3	Recognition of headache types	Self-assessed competence
Q4	Ability to differentiate headache types from history	Self-assessed competence
Q5	Awareness of where to find diagnostic criteria	Self-assessed competence
Q6	Recognition of medication classes causing MOH	Objectively-scored knowledge
Q7	Advisable intake frequency of analgesics/triptans	Objectively-scored knowledge
Q9	Threshold for initiating preventive treatment	Objectively-scored knowledge

Table 1. Classification of knowledge-related survey items

Results

Headache was a frequent presenting or contributing complaint: 49% of respondents saw more than five patients per week where headache was the primary reason for consultation, and 83% saw more than five per week where it was a contributing factor. Most respondents reported routinely asking about medication use: 73% asked about both dosage and frequency of OTC and prescription medication, and 69% had advised patients to see their GP on suspicion of MOH.".

Self-assessed competence in recognising and differentiating headache types was near-universal: all respondents (100%) reported recognising at least one headache phenotype, and 99% reported being able to differentiate at least some headache types from a clinical history. However, only 64% reported knowing where to find the formal ICHD-3 diagnostic criteria. Confidence in clinical recognition was not consistently matched by familiarity with the formal diagnostic framework. On the objectively scored items, knowledge was more variable. While 91% correctly identified paracetamol, 70% recognised NSAIDs and 74% recognised combination analgesics as potential causes of MOH, only 49% identified opioids and 53% identified triptans correctly. For advisable intake frequency, 68% chose an answer within recommended limits, 5% chose an answer exceeding the limit for triptans and combination analgesics (<4 days per week), and 27% did not know the advisable intake frequency of acute medication. Knowledge of when to consider preventive treatment was limited: 18% chose the correct threshold of 4 days per month, 34% chose a higher threshold (6 or 10 days), and 49% did not know.

Discussion

Taken together, respondents reported high confidence in recognising and distinguishing headache types, whereas knowledge of MOH-inducing medications, intake thresholds and preventive treatment criteria was more limited. Because these two areas were measured differently, the findings do not indicate that respondents overestimate their own knowledge, but they do point to a specific, targetable educational gap.

This pattern is in line with the 2022 UK survey of osteopathic headache knowledge, which found that prior headache-specific education, rather than years in practise predicted knowledge scores(11). As most Danish osteopaths train first as physiotherapists(13), with an emphasis on musculoskeletal assessment rather than pharmacology or diagnostic criteria, the observed gap likely reflects a specific, addressable educational deficit rather than a lack of clinical engagement.

Importantly, this gap does not undermine osteopaths' potential contribution to MOH recognition: the frequent clinical exposure and routine questioning of medication use reported here indicate that they are already collecting the raw clinical data needed for early recognition. What appears to be missing is an interpretive framework for acting on them. This suggests osteopaths could strengthen their contribution through relatively low-cost, targeted education, such as clear guidance on medication thresholds and referral pathways, rather than broader retraining. This would complement existing awareness efforts aimed at GPs and pharmacists and reflect the reality that patients with chronic headache often navigate multiple points of care in primary healthcare (3,10,14).

Several limitations should be considered. The questionnaire relied on self-report for most items and had not been validated; unlike instruments using scored case vignettes, it cannot fully distinguish genuine knowledge from guessing or social desirability bias. Q7combined simple analgesics and triptans, which have different recommended limits, and the response options overlapped, so results for this item should be interpreted with caution. Q9 referred to headache in general, whereas the threshold applies to migraine(12) . The sample was modest and self-selected (n=101: 63 qualified osteopaths, 38 osteopathic students; 24% response rate). A single-country design further limits generalisability. Future studies should use validated, tested knowledge measures, such as case-based vignettes, to confirm and quantify this gap and, ideally, extend to the wider manual-therapy workforce with similar patient exposure.

Conclusion

Danish osteopaths frequently interact with patients presenting with headache, including MOH-relevant presentations, and many already collect clinically relevant medication information as part of routine practice. However, while confidence in recognising headache types was high, knowledge of MOH-specific medications, intake thresholds and preventive treatment criteria was limited. These findings support the plausibility of osteopaths as an additional primary-care touchpoint for early MOH recognition and identify specific, addressable educational targets, to be confirmed in future studies using validated knowledge measures.

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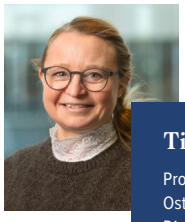

Tina Kolby

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Osteopathy in Context:

Reflections on the Nordic Osteopathic Congress 2026

Gothenburg, 12–13 September

Text: Emmelie Hansen
Photos: Michael Jönsson, Vega Photo

The Nordic Osteopathic Congress 2026 brought neuroscience, philosophy of science, emergency medicine and clinical osteopathy into the same room. The result was a sustained reflection on a question that concerns every health profession: what does it mean to treat a patient in context?



Photo: Participants of the Nordic Osteopathic Congress 2026 at the Quality Hotel Waterfront, Gothenburg.

Not long ago, osteopaths in the Nordic countries worked largely in parallel. Today, the Nordic Osteopathic Alliance gathers them in an annual congress, rotating between the five Nordic countries. This year, Svenska Osteopatförbundet hosted around 75 participants under the theme Osteopathy in Context: Perspectives, Practice and Collaboration, together with representatives of The Nordic Osteopathic Alliance, Osteopathy Europe and the General Osteopathic Council (UK). The programme was deliberately interdisciplinary, built on the conviction that osteopathy develops best in dialogue with the wider scientific and clinical community.

The body, the evidence and the encounter

David Josefsson, physiotherapist (MSc) and osteopath D.O., opened with a systems perspective on pain. Drawing on complex adaptive systems theory, he described chronic pain as a phase shift, in which the organism settles into a new and persistent state. The model accounts for the non-linear course of both deterioration and recovery, and supports the view that manual therapy, like exercise, acts largely through systemic mechanisms.

Morten Sager, Associate Professor in Theory of Science at the University of Gothenburg, turned to knowledge itself. He recognised the achievements of evidence-based practice while identifying its limits for patients who do not resemble trial populations and argued that formalised evidence and professional judgement are mutually dependent. The panel that followed, moderated by Dr Niklas Sinderholm, osteopath and Programme Director at NIMM, explored how research and clinical experience can inform one another.



Karin Jensen, Professor of Cognitive Neuroscience at Karolinska Institutet, presented the neuroscience of placebo. Expectation has measurable neurobiological effects: the same dose of morphine gives clearly greater pain relief when the patient knows it is being given. Placebo is therefore not a residual to be subtracted, but part of every clinical encounter. The interprofessional panel that closed the day, with Hanna Tomasdottir, President of Danske Osteopater, and Matthew Redford, Chief



Photo: Professor Karin Jensen: "The placebo effect is part of active treatment."



Photo: Between sessions: the exhibition area at NOC 2026.



Photo: Morten Sager on epistemological choices in manual medicine.

Executive and Registrar of the General Osteopathic Council, moderated by Filip Olow, considered what this means for collaboration between professions.

Responsibility beyond the treatment room

The second day moved from principles to clinical responsibility. Silvia Triay, osteopath (MSc) and physiotherapist from Mallorca, presented qualitative research on osteopathic approaches to infertility, distinguishing carefully between biological plausibility and demonstrated efficacy. Filip Olow, resident physician in emergency medicine and osteopath (MSc), addressed safety netting and referral: the quality of care is also measured by how well patients are guided once they leave our hands. Helena Löwen-Åberg, specialist physiotherapist in tinnitus rehabilitation and author of Tinnitushjälpen, presented tinnitus as a condition requiring audiological, somatic and psychological perspectives together. The closing panel, moderated by Matthew Redford, drew the threads together: specialised knowledge serves patients only when it is shared across professions and held to an honest standard of evidence.

A forum worth returning to

Taken together, the programme formed a coherent argument. The patient is a complex system, knowledge is plural, the clinical encounter is itself therapeutic, and responsibility extends beyond any single profession. These questions matter to osteopaths across Europe and to physiotherapists, naprapaths, chiropractors and physicians alike. For a profession whose regulatory status still differs across the Nordic countries, shared forums of this kind strengthen both its knowledge base and its voice.

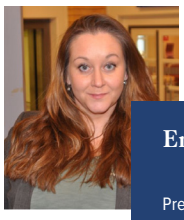
The Nordic Osteopathic Congress 2027 is planned for Helsinki, Finland, in November 2027, alongside the congress of the Osteopathic International Alliance (OIA), offering Nordic osteopaths a meeting point with the global osteopathic community.

About the Nordic Osteopathic Congress

An annual congress organised by the Nordic Osteopathic Alliance (NOA), hosted in turn by Denmark, Finland, Iceland, Norway and Sweden. Held in English and open to osteopaths, students and colleagues from other professions, such as physiotherapists, naprapaths, chiropractors and physicians.

NOC 2026: Quality Hotel Waterfront, Gothenburg. Six lectures and three panels. Hosted by Svenska Osteopatförbundet; organised by the SOF Board: Emmelie Hansen (President), Eric Gunnarsson (Vice President), Ann-Sofie El Dana, Olga Vidfar, Tove Blomdahl and Jonathan Bengtsson. Master of Ceremonies: Maurice Cheng, CEO of Osteopathy Europe.

NOC 2027: Helsinki, Finland, November 2027 (planned), alongside the OIA congress · nordicosteopathicalliance.org



Emmelie Hansen

President, Svenska Osteopatförbundet (SOF)

Orofacial functions and craniofacial morphogenesis

Influence of breastfeeding, swallowing, and mastication: a narrative review and biomechanical hypothesis

Text: Gunn Kvivik

Abstract

Background: Malocclusion and narrow dental arches are common in modern populations, whereas studies of pre-historic human crania describe broad U-formed dental arches and well-aligned teeth. This narrative review explores the role of our society and the biomechanical influence of orofacial functions on craniofacial morphogenesis.

Summary: Breastfeeding, in contrast to bottle-feeding, requires sustained intraoral vacuum, nasal respiration and coordinated activity of the velopharyngo-facial musculature. These forces are discussed in relation to sutural adapta-tion, palatal descent, mandibular growth, and dental-arch development. After primary dentition erupts, mastication and swallowing develop, providing further functional stimuli. Persistent infantile swallowing, particularly with low tongue posture and oral breathing, is associated with altered craniofacial development and malocclusion.

Conclusion: Craniofacial morphogenesis is shaped by the genetic, environmental, emotional, biochemical, and biomechanical factors from foetal life onwards, emphasizing the value of an interdisciplinary perspective. Further research is needed to explore the interactions between these influences.

1. Introduction

Malocclusion is highly prevalent in modern populations, with approximately 50–75% of adolescents presenting some degree of malocclusion.[1] Maxillary transverse deficiency is among the most common skeletal findings in orthodontic practice, characterised by a narrow palate, associated with a V-formed dental arch, crowding of the teeth, overjet, and mandibular retrognathia (fig 1B).[2-3] The absence of third molars becomes increasingly more common associated with smaller facial dimensions.[4] In contrast, studies of prehistoric human skulls and Indigenous popula-tions consistently demonstrate broad U-formed dental arches, well-aligned teeth, and normocclusion (fig 1 A).[3,5]Together, these observations suggest that humans develop under environmental and functional conditions that differ from prehistoric populations. This raises questions about whether increased stress, medicalisation of pregnancy and childbirth, changes of infant feeding practices, and altered orofacial functions contribute to changes in craniofa-cial morphology.

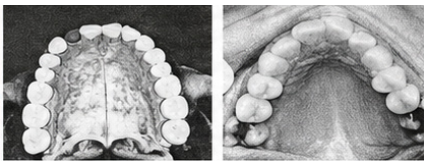


Fig 1. Prehistoric cranium with low palate and u-formed dental arch(A)
High palate with V-formed dental arch(B)[3]

Modern maternity care involves fewer physiological births and more obstetric interventions. In several high-income countries, Caesarean section rates approach 50%, while epidural analgesia is routine in many maternity units. In our previous clinical study, labour duration was approximately four hours longer following epidural analgesia than after physiological birth.[6–7] Infants exposed to obstetric interventions showed a fivefold higher occurrence of cranial-base dysfunction than infants born naturally. These findings suggest that the perinatal period may influence early cranio-facial adaptation. Breastfeeding, the physiological method of infant feeding, reached its lowest rates in many West-ern countries during the 1970s following extensive marketing of infant formula. Numerous studies have examined the immunological benefits of breastfeeding. Over four years we reviewed 34 studies, focusing mainly on the me-chanical influence of nursing. These studies indicated that breastfed children had fewer problems with overjet, a lower palate and better dental alignment compared with bottle-fed infants.[8-9] We also conducted a clinical study involving 60 infants, examined after birth, and again at three months in collaboration with our mentors Darraillans, Dr Chancholle, and Denys-Struyf. Chancholle made significant contributions to the understanding of breastfeeding physiology through extensive research and the development of surgical techniques for palatal and velopharyngeal reconstruction, essential for all orofacial functions.[10,13]

This narrative review explores the influence of physiological orofacial functions on craniofacial morphogenesis, with particular emphasis on the biomechanical effects of suction during nursing, swallowing, mastication and respiration.

2. Anatomical foundations and embryology

Relevant muscular anatomy: Velopharyngo-facial muscle loops

Chancholle describes the velopharyngo facial system as interconnected myofascial loops. The superior pharyngeal constrictor muscle plays a central biomechanical role through its elongations forming four muscular loops:[13]

- Auditory tube➔ salpingopharyngeus m.
- Velum➔ palatopharyngeus m.
- Tongue➔ glossopharyngeal part.
- Mouth➔ pterygomandibular raphe, buccinator, and orbicularis oris mm.

Because breastfeeding requires a constant intraoral vacuum to extract the milk10-13, constant coordination of all these muscle loops is required during suction, swallowing, respiration, and middle ear ventilation. The muscle loops undergo changes during dentition when the tongue loop is strengthened, and later when larynx descends and speech develops.[10,13]

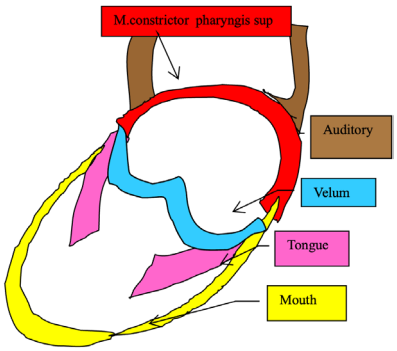


Fig 2. Muscle loops, modified after Chancholle, superior view[13]

Synchronization of the muscle chains (G.D.S.)

G. Denys-Struyf, founder of the muscle chains used in osteopathy, contributed to our research integrating the muscle chains and Chancholle`s muscle loop during suction and swallowing.6 The mouth is the meeting point where all the muscle chains are unified and synchronised (fig 3), breastfeeding primarily activates the central chain in coordination with the AM chain:

The anteromedian (AM) chain extends from below to the lower lip through hyoid and tongue.

The central pharyngoprevertebral chain (PA-AP):

The posterior static PA component has fixation point superior stabilising head in a neutral position during nursing.

The velopharyngo-facial muscles are elements of the anterior dynamic AP component.

During swallowing, fixation point is superior, during suction, the fixation point is inferior, acting with AM to lower mandible and generate intraoral vacuum.

The remaining chains are activated to a lesser degree:

• postero-lateral (PL) and antero-lateral (AL) mastication chains are activated through mandibular protraction during suction.

• posterior-median chain (PM) comes from behind to the upper lip, with a balancing function during breastfeeding.

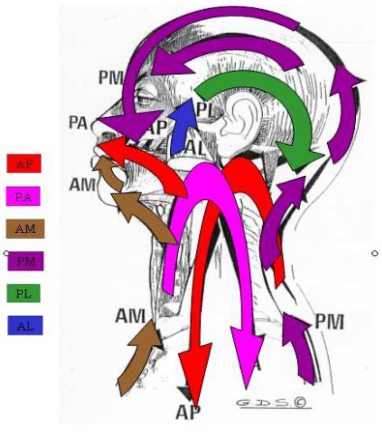


Fig 3. Synchronisation of muscle chains during nursing.[6]

Embryonic development and morphogenetic fields of the face

The morphogenetic fields described by Blechschmidt are functional organisational patterns involved in shaping of the organism by animating the cells from the outside through biochemical signalling[14]. They arise from the ecto-derm during the 4-10 intrauterine week connecting different regions of the body due to migration of cranial neural crest cells.15 These elliptical fields are self-maintaining interactive systems capable of regeneration from early foetal stages throughout life. Building on Blechschmidt's work, Darraillans described the morphogenetic fields of the face associated with different craniofacial and body regions.[15] (fig 4):

1. **Optic arch** - associated with the upper face and eyes, functionally related to sphenobasilar synchondrosis (SBS) and cerebrum.
2. **Superior pharyngeal arch** - associated with the midface and oral cavity, functionally related to the cerebellum and thorax.
3. **Medial pharyngeal arch** - associated with the tongue and mouth loop, functionally related to C0–C1 and the visceral system. The tongue develops from all pharyngeal arches but predominantly the medial arch.
4. **Inferior pharyngeal arch** - associated with the lower face, hyoid and larynx, functionally related to C0–C2, the pelvis, and the extremities.

From this perspective, craniofacial development is understood as an integrated process rather than as the independent growth of individual bones. The relationships between the cranial base, upper cervical region, velopharyngeal struc-tures, tongue, and facial skeleton provide a basis for understanding how functional disturbances may be reflected in craniofacial morphogenesis.

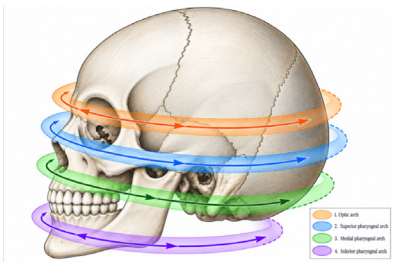


Fig 4. Morphogenetic fields of the face according to Darraillans[15]

Maternal and intrauterine influences

The intrauterine environment provides continuous sensory and physiological stimulation to the developing foetus. Relier emphasized the importance of foetal sensory capacity and the mother-foetus relationship during pregnancy.[18,19] Maternal diet influences taste and smell of the amniotic fluid and the breast milk. Familiar sensory input in breast milk along with physical contact and oxytocin release may facilitate the transition to extrauterine life and contribute to mother–infant bonding. According to Cyrulnik and Relier, maternal emotional and physiologi-cal states influence foetal behaviour, development and postural responses.[16-20] Cyrulnik describes maternal emotion-al states as producing distinct biochemical changes that are perceived by the foetus as "pre-emotions" through the amniotic fluid.[16,17] A calm maternal state supports a more flexed foetal posture, whereas increased maternal stress is associated with more reactive patterns, including trunk extension and increased limb movements. Development of orofacial structures and perception of « pre-emotions » occurs at the same period as smell, taste, suction, swallow-ing and foetal «breathing» of amniotic fluid.

Darraillans therefore proposes that emotions are manifested in the facial structures. Intrauterine stress may influ-ence the position and muscle tone of the tongue, often with a retruded mandible. Later it may manifest as oral hab-its, including thumb sucking, pacifier dependence, smoking, or compulsive eating15. He also proposes effects on the functional organisation of cerebellum and other primitive brain structures with a higher reactivity to stress later in life (fig 5).



Fig 5. Infant with breastfeeding problem, pronounced to intrauterine stress, observed sleeping in extension.

3: Principles of craniofacial growth

Within osteopathy reduced elasticity in cranial sutures synchondrosis may influence growth of adjacent bones and affect craniofacial development. In Frymann's study of 1,250 newborn infants, 88% were reported to present with one or more cranial dysfunctions, including visible cranial deformation and strain patterns.[21]Moss's functional ma-trix hypothesis proposes that craniofacial morphology develops as an adaptive response to the functional demands of surrounding soft tissues, rather than through an independent genetic programme governing the

final shape of bone.[22–23] Melsen later provided histological evidence supporting this concept by demonstrating how mechanical forces are converted into cellular responses within sutures and bone.2[4-25] Mechanical stimulation generated by phys-iological function influences osteoblasts, osteoclasts, fibroblasts, and osteocytes, resulting in continuous modelling and remodelling of craniofacial tissues. Proffit's Equilibrium theory further demonstrated that low, continuous forces generated by the tongue, lips, and cheeks exert a greater influence on tooth position than brief masticatory forces.[26]

4. Biomechanics of infant feeding

Infant feeding represents the first major postnatal functional activity of the orofacial system. The principal difference between breastfeeding and bottle-feeding is the magnitude of the intraoral vacuum required to extract milk.[10-13]
During suction on the breast the infant needs to breathe through the nose; if not, it loses the nipple and the vacuum. The airtight space is created by a three-dimensional closure of the lips, velopharyngeal, and pharyngolingual sphinc-ters. The apex of the tongue presses against the nipple and areola in coordination with the mouth loop (orbicular and buccinator muscles).

Coordination of suction

The strong intraoral vacuum during breastfeeding is generated through constant labial occlusion, mandibular de-pression, and protraction (fig 6A). Pressure drops from 760 mmHg (atmospheric) to 60 mmHg, and milk is aspi-rated [10,13] The mandible then elevates and retracts, and pressure returns to subatmospheric pressure (fig 6B).[11-12] Suc-tion during bottle-feeding requires less vacuum and muscular coordination because nasal breathing is not necessary; it can open its mouth without losing the teat. The mandible is less protracted and the tongue functions more like a piston to control the milk flow.[10-12]

Coordination of infantile swallowing

Swallowing occurs during a brief respiratory pause, with closure of nasopharynx and elevation of the pharynx, larynx, and hyoid. Swallowing during breastfeeding involves a peristaltic tongue movement presses anteriorly against the nipple, the central part forms a depression to collect the milk, and the posterior part lowers to opens the passage to pharynx. In contrast swallowing during bottle-feeding involves reduced muscular activity of the lips, tongue, and mandible with a relatively posterior position of the tongue and mandible. Suction-to-swallowing ratio is 2–3:1 during breastfeeding and 1:1 during bottle-feeding.[10-13]

5. Biomechanical stimulation of early craniofacial growth

In our clinical studies after three months of infant feeding, only breastfed infants presented significant results with 30% greater increase in zygomatic bone growth and 70 % reduction of facial sutural dysfunctions. The orofacial bones are mainly formed through membranous ossification depending on extraosseous stimuli for optimal growth. We propose that the mandibular protraction and lip protrusion create an important traction on these sutures through the facial muscles, stimulating sutural adaptation and growth.[6-7]

Palatal descent and dental arches

The vacuum created during breastfeeding stimulates descent of the hard palate and vomer, the maxillary alveolar processes develop laterally, resulting in gradual widening of the dental arches promoting a broad U-shaped dental arch.[10,13] The tongue acts internally against the palate, while the lips and cheeks act externally, shaping the dental arches and facial skeleton. According to Delaire, repeated mandibular protraction during breastfeeding stimulates growth of the mandibular body, initially retruded at birth, through traction on the sphenomandibular ligament. These movements also stimulate condylar cartilage growth.[27] Together, these mechanisms may explain the lower frequency of mandibular retrognathia and overjet reported in breastfed infants.[8-9,27]

Biomechanical hypothesis on cranial base angulation

The cranial base undergoes substantial angulation during early development. Carreiro describes progressive flexion of the sphenobasilar synchondrosis (SBS) up to six years of age (fig 7B). In the newborn cranium, the pterygoid processes are short and oriented anteriorly, while the palate is relatively high (fig 7A). During the first year, the palate descends, and the pterygoid processes lengthen and become more vertically oriented.[6,28] George demonstrated significant changes in cranial base angulation between 1 to 9 months of age,[29] while Watanabe reported changes be-tween 2-18 months, suggesting that brain growth and the development of upright posture could explain this angulation.[30]

Considering that these changes coincide with the period of breastfeeding, during which both the quality[10-13] and quantity1[2] of suction differ substantially from bottle-feeding, we suggest that the superior pharyngeal constrictor muscle, acting as a coordinator of the muscle loops, plays a significant biomechanical role. Following discussions with Chancholle, we propose that this muscle acts as a functional lever during breastfeeding, exerting posterior traction through its attachments to the pterygoid processes, thereby influencing sphenoid orientation and contrib-uting to the unfolding of the cranial base.[6-7,13]

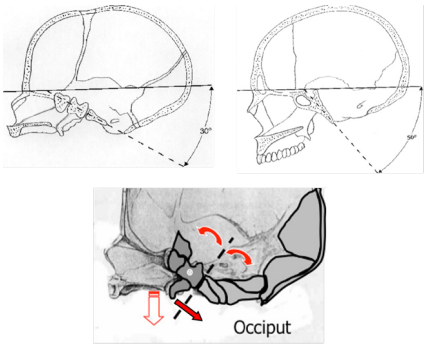


Fig 7. Angulation of cranial base;
Newborn cranium(A), adult cranium(B)[28], hypothesis: sphenoidal flexion during suction on the breast(C)[6,7]

In addition, intraoral vacuum may contribute to the descent of the palate and vomer, a mechanism described within the traditional craniosacral model as facilitating SBS flexion.[6-7,13] This hypothesis provides a possible biomechanical explanation for the relationship between postnatal cranial base adaptation, widening of the dental arches, and reduced overjet reported in breastfed children. Further investigation is needed.

6. Orofacial functions after dentition

Mastication and solid foods

The eruption of the primary dentition marks an important stage in craniofacial development when breastfeeding

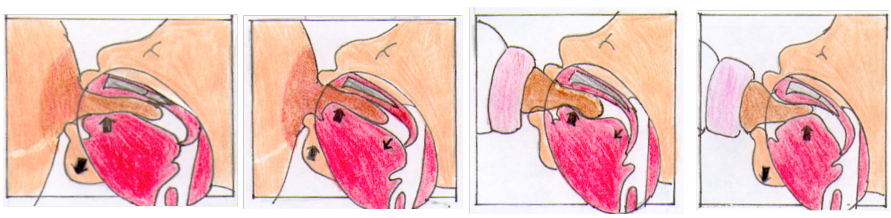


Fig 6. Breastfeeding
Depression(A) and elevation phase(B)

Bottle-feeding
Depression(C) and elevation phase(D)12

is gradually replaced by mastication, adult swallowing, and speech. Exposure to solid foods increases masticatory activity. Attritional occlusion (fig 8A) is a physiological wear of the primary teeth, that contributes to transverse jaw development and reducing the risk of malocclusions, such as crossbite (fig 8B).[5,31] This tooth wear is often a source of concern for parents, often misinterpreted as stress-related grinding.



Fig 8. Attritional occlusion(A), unilateral crossbite without attritional occlusion(B)

Adult swallowing

Swallowing gradually matures with dentition around 3-5 years of age. Adult swallowing is characterised by dental occlusion, the anterior pulsion of the tongue is replaced by a posterosuperior contact against the palate. Humans swallow approximately 2,000–3,000 times each day, making swallowing one of the most frequent physiological stimuli acting on the craniofacial skeleton.[32]

Persistent infantile swallowing (atypical)

Atypical swallowing, reported in up to 50% of adults, is characterised by propulsion of the tongue (tongue trust) with reduced palatal contact, activation of orbicular muscles, frequently combined with a low tongue posture and oral breathing.[32] Depending on the position of the tongue direction of pressure, different malocclusions may devel-op, including narrow palate, overjet, anterior open bite, or mandibular prognathism.[32-33]

Influence of swallowing and respiration on SBS

According to Darraillans, adult swallowing stimulates flexion of the SBS, associated with a broad U-shaped dental arch that supports normocclusion and nasal breathing.[33] A low anterior tongue position during swallowing stimu-lates extension of SBS, compression of C0–C1, associated with kyphotic posture, and oral breathing.[15,33] Nasal respiration is crucial for orofacial development including the nasal cavities and sinuses. Habitual mouth breathing is linked to altered dentofacial development, malocclusion and a narrow palate.[34] During respiration teeth should be separated with a small interocclusal space, occlusion should only take place during swallowing and mastication. Optimal nasal breathing requires a high tongue position and an upright posture, with important interaction of all these parameters. Darraillans postulates that the tongue should be positioned superiorly against the palate in a “suc-tion” position mimicking breastfeeding for optimal nasal respiration and posture.[15]

In our clinical practice, it is important to restore mobility of orofacial structures and cranial base to facilitate nasal breathing. We also propose vented mouth taping for adolescents and adults with a small opening to encourage nasal breathing and improve both mandibular and tongue position (fig 9). Its efficacy and safety require further investiga-tion.



Fig 9. Vented mouth taping

7. Interdisciplinary implications and clinical perspectives

The relationship between orofacial function and craniofacial development has relevance across osteopathy, dentistry, orthodontics, speech therapy, and maxillofacial physiotherapy.

Functional orthodontics

Approaches such as slow palate expansion, removable or fixed, gradually widens a narrow palate and supports orofacial growth prior to dental correction (fig 10).[24-25,35] Improved breathing has also been reported, as expansion increases the dimensions of nasal cavity and sinuses.

Orthodontists and dentists working in interdisciplinary settings have reported that combining orthodontic treatment with osteopathic care may shorten treatment time, most significant in patients with overjet[36] and unilateral cross-bite.[37] German orthodontist and osteopath Brandner uses Soulet-Besombes Balancer to influence dentoalveolar de-velopment, inspired by Darraillans (fig 11A). In collaboration with osteopaths, she uses this myofunctional appli-ance to restore physiological orofacial function including tongue posture, swallowing,



nasal breathing, chewing, and phonation.[33]

Fig 11. S.B. Balancer used by Brandner(A)[33] FroggyMouth: oral appliance to restore physiological swallowing(B)[38-39]

FroggyMouth, developed by Fellus, is an oral appliance designed to restore physiological swallowing and tongue posture at subcortical level (fig 11B).[38-39] It is used for 15 minutes per day over five weeks from 3 years of age. Before dental alignment it is important to restore physiological swallowing, to avoid anterior pressure from the tongue on the teeth and reduce risk of relapse after orthodontic treatment. FroggyMouth also supports nasal breath-ing, speech development, and overall posture. Specialised physiotherapists and speech therapists can help improve proprioceptive awareness and voluntary control of tongue posture.

Infant guidance

Osteopathy can play an important role in supporting infants with breastfeeding difficulties. Effective sucking requires adequate neural input and coordinated activation of the velopharyngo-facial musculature. Reduced cranial mobility, particularly in the cranial base, may contribute to mandibular deviation or retrusion, making it difficult to generate sufficient intraoral vacuum. In our study, both groups showed an increase in dysfunctions of the posterior cranial region and cranial base after three months, highlighting the importance of early osteopathic treatment of cranial dysfunctions, integrating the morphogenetic fields of the face.[6-7]

A respectful and supportive approach is important when guiding mothers and infants towards an effective nursing position, helping to build confidence and support secure attachment (Fig. 12). When bottle-feeding, a physiological teat designed to mimic breastfeeding mechanics is recommended. Following

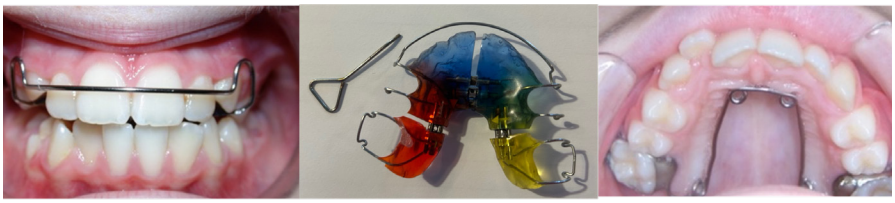


Fig 10. Functional orthodontics: Removable(A-B), Quad helix is a fixed palate expander, (C)

Fellus' recommendations, we advise limiting pacifier use beyond six months of age. Prolonged pacifier use has been associated with an increased risk of otitis media, possible speech difficulties, and anterior open bite.38,40 According to Darraillans, oral habits may be influenced by intrauterine stress. In our clinical experience, osteopathic treatment can help children stop pacifier use and thumb-sucking, if necessary, in combination with habit-breaking appliances, preferably removable ones such as Machouyou. Following the eruption of primary teeth, exposure to solid foods requiring mastication is important for dental arch development.



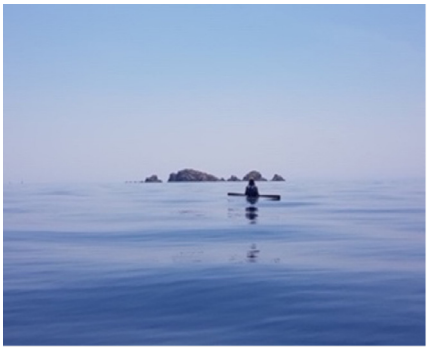
Fig 12. Hospital Font-pré, Toulon(F) where infants were evaluated for our research[6-7]

8. Discussion

While this review has focused on the mechanical aspects of orofacial function, craniofacial development is also in-fluenced by nutrition, physical activity and psychosocial factors throughout life. Poor dietary quality, characterised by high consumption of sugar and ultra-processed foods, may compromise skeletal development through insuffi-cient intake of essential nutrients required for bone mineralisation and growth.41 Reduced physical activity and pro-longed screen time may affect posture and the functional relationships between the upper cervical region and cranio-facial structures.42 The orofacial system also plays an important role in communication, as facial expression, vocali-sation and speech require coordinated activity of the velopharyngo-facial musculature. Modern lifestyles, character-ised by chronic stress, sociocultural appearance pressure, persistent hypervigilance, high caffeine consumption and insufficient sleep, may affect emotional regulation and physiological development. From a sociological perspective, Rosa describes modern society as characterised by increasing acceleration and changing forms of communication, introducing resonance as a central concept.43 Extending this concept to osteopathic practice, Darraillans draws on Meyl's hypothesis of quantum biological communication and emphasises the importance of the practitioner being grounded and centred before establishing resonance with a patient.15 Our clinical observations are consistent with Darraillans' teachings that occlusion may partly be understood as an expression of the psyche, reflecting the interre-lationship between emotional state, function and structure.



Fig 13. Gunn, Bernard and Line, 2018 (A), In resonance with nature (B)



9. Conclusion

Craniofacial growth depends on the interaction between genetic programming and functional biomechanical forces from foetal life onwards. Infant feeding represents the first major postnatal functional activity of the orofacial sys-tem. The velopharyngo-facial muscles activated during breastfeeding provide distinct biomechanical stimuli to the craniofacial structures compared with bottle-feeding. Mature swallowing, mastication of solid foods, and nasal breathing continue to influence craniofacial development. Malocclusion and underdeveloped dental arches are com-mon features of modern craniofacial morphology. Further research should examine how orofacial functions interacts with emotional regulation and the broader developmental environment. From an osteopathic perspective, supporting physiological function throughout pregnancy, birth, infancy, and childhood represents an important preventive con-tribution to craniofacial morphogenesis.

"The babies we treat today will be in better health tomorrow."
— Viola Frymann

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