



The Native American heritage of the body-mind-spirit paradigm in osteopathic principles and practices

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ABSTRACT

The purpose of the current commentary was to document how Native American healing traditions may have influenced A.T. Still in the development of osteopathic principles and how current neuroscience models describing shamanic healing practices of Native American healers may have applicability for osteopathic manipulative practices. Recent materials from the Museum of Osteopathic Medicine document when Still was living among the Shawnee and suggest he was familiar with their healing traditions. Although he introduced the body-mind-spirit paradigm, derived from a key Native American healing concept, into Western medicine, this paradigm still lacks scientific grounding. Neuroscience models may offer a theoretical framework for the 'spiritual' component of the body-mind-spirit paradigm with brain predictive processing models that describe spiritual experiences of patients in altered states of consciousness. With its traditional medicine heritage and current evidence-based approach, the osteopathic profession is in a unique position to promote the scientific model of holistic care.

Introduction: New materials about A.T. Still's life with Native Americans

One purpose of the current commentary is to describe Native American spirituality and healing practices, known as 'shamanism' in the Western world [1], and show how they may have influenced A.T. Still in the development of osteopathic medicine. This discussion seems justified by the recent release of materials from the Museum of Osteopathic Medicine in Kirksville, Missouri (USA), which formally document connections with Native Americans that Still described in his autobiography. For instance, he described visiting Native Americans: 'In May, 1853, my wife and I moved to the Wakarusa Mission, Kans., occupied by the Shawnee tribe. It was all Indian there' [2 p. 60–61]. He also indicated that he treated Native Americans: 'Then with my father I doctored the Indians all fall' [2 p. 61]. As a result, he wrote that 'I soon learned to speak their tongue, and gave them such drugs as white men used, cured most of the cases I met, and was well received by the Shawnees' [2 p. 61–62].

In addition to the above statements, Still explicitly described

exhuming bodies from Native American graves for dissection so he could better learn anatomy and bony structure, the results of which influenced the early development of osteopathy [2]. Native American culture relies on a rich oral tradition, not a written history [3], so few materials are available to corroborate Still's interactions with Native Americans. Therefore, we must rely on information from Still. For instance, in addition to being able to speak the Shawnee language [4], there is evidence that his daughter Blanche could write the Shawnee language (Fig. 1). He also had a Navajo carpet to cover his table for osteopathic manipulative treatments (Fig. 2). Further, Native American healing traditions emphasize a holistic approach to maintain a balanced, fulfilling lifestyle and view health and well-being as a balance among physical, mental, contextual, and spiritual factors [5]. These concepts are also present in Still's early writings [6].

The body-mind-spirit paradigm, derived from key Native American healing practices [3], is at the core of two healthcare healing principles: the shamanic [1] and the osteopathic [7]. However, the holistic body-mind-spirit approach to healthcare [8] may not be used by all osteopathic practitioners since some may prefer a body-mind approach,

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*Indian Blessing
 given to me by Pa.*

*Ne. ow. na. Na-more
 gigita mo Smile teer
 Swyah ta. pa. nung
 Ita noyma ta. pa. ma. ta qua
 ta pe. Which means
 What we do now comes from the
 loving God and we do love and
 thank Him. Pitch in.
 Pē au. lieu. Come here.
 Piscachee. Go away.
 Sago. hello. Methie head
 methie dog
 Quama woman.
 Idelene man.
 Squala they thether girl.
 E ne Thank you*

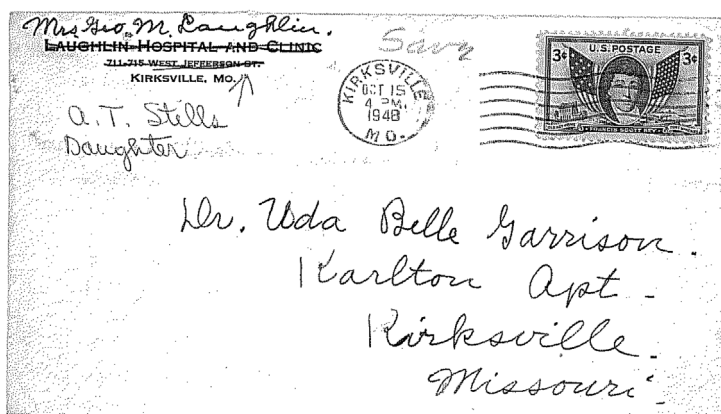


Fig. 1. Indian blessing written by A.T. Still's daughter Blanche. Museum of Osteopathic Medicine, Kirksville, Missouri, USA.



Fig. 2. Germantown Navajo carpet that A.T. Still used to cover his treatment table. Museum of Osteopathic Medicine, Kirksville, Missouri, USA [2008.33.16].

similar to other Western musculoskeletal practices, that is supported by scientific evidence [9]. This duality of osteopathic practices, one led by evidence and the other by principles, may be a source of conflicting views within the profession and worsened by the pressure of a health-care environment shaped by evidence [10]. Osteopathic manipulative techniques described with inappropriate metaphoric, non-scientific, or outdated models can exacerbate this duality [10]. Further, scientific models exist that incorporate traditional medicine practices and spiritual components of patients into treatment [11,12].

Another purpose of the current commentary is to present neuroscience models that account for shamanic healing and describe how they may have applicability for osteopathic practices. According to Frecska and Luna [11], neuroscientific explanations based on classical cognition fail to explain therapeutic information during shamanic healing. Thus, the authors proposed a model for therapeutic information processing that describes two states of consciousness for patients during treatment, i.e., the ordinary and the shamanic/non-ordinary [11]. Neuroscience models may also offer another theoretical framework for the 'spiritual' component of the body-mind-spirit paradigm through a brain predictive processing model that describes spiritual experiences of patients in altered states of consciousness [12].

This paper is not historical research because of the scarce materials available at the Museum of Osteopathic Medicine combined to the oral tradition of the Native American culture, it is likely that only historians would have the methods to explore this period of the life of AT Still among the Shawnee. As described throughout our manuscript, our intent is to explicitly describe this forgotten heritage that may have influenced AT Still in the early development of osteopathy. This is possible today, because some material is now available from the Museum that can corroborate his writings in his autobiography. In the meantime, neuroscientific models are now available to describe shamanic/

Native American healing methods. We consider this is an appropriate time to present historical and cultural material alongside a scientific narrative. Further, key connections between osteopathic medicine and Native American concepts are already public: <https://www.atsu.edu/american-indian#atsu039s-american-indian-heritage> and <https://www.atsu.edu/museum-of-osteopathic-medicine/dr-stills-heritage-reflects-american-indian-ties>.

Therefore, with its traditional medicine heritage and current evidence-based approach, the osteopathic profession is in a unique position to promote a scientific model of holistic care that provides a more inclusive approach for the rich variety of interpretations of osteopathic principles and practices.

Shamanism, Native American spirituality, and healing practices

Although the term *shaman* properly refers to a traditional healer of the indigenous peoples of Siberia, Manchuria, and Central Asia, it is now a generic label for medicine people and spiritual healers from native tribes around the globe [1]. Shamans believe two realities reflect state of consciousness: patients in the ordinary state of consciousness perceive ordinary reality and those in the altered or shamanic state of consciousness enter into and perceive non-ordinary reality [13]. A ritual component is a key element in the healing shamanic tradition; typically, patients are brought from an ordinary to a non-ordinary reality through methods such as use of medicinal plants (hallucinogens), monotonous drumming, repeated refrains, fatigue, fasting, and dancing [11]. The resulting breakdown of ordinary reality perception is not the ultimate goal; rather, it is to facilitate psychointegration for therapeutic purpose [14]. Shamans provide entry to altered states of consciousness from which the patient may return healed, and they are considered singularly qualified to assist those in ordinary and non-ordinary realities [15]. Whereas the Western healing framework is a linear model based on cause and effect, the traditional healing framework does not target symptoms or causes but focuses on returning the individual to balance [5]. Some shamanic traditions use a culturally grounded conceptual framework, e.g., a wheel with four quadrants representing four elements that impact well-being and must be balanced [5]. These four quadrants are context (family, culture, community, environment, history); mind (cognition, emotion, identity); body (physical needs and genetic makeup, practical needs—including financial needs); and spirit (spiritual practices and teachings, dreams, stories) [5].

In each Native American tribe, healing traditions of the medicine family are handed down by word-of-mouth from one generation to the next [3]. Although each tribe has its own ceremonies or rituals to treat disease, common principles exist across tribes, principally achieving wholeness through a holistic approach that encompasses body, mind, emotions, and spirit [3]. This view of wholeness extends to the interrelation of all living things (i.e., people, nature, spirits, and the life force) and is physically represented by the quadrants of the sacred Medicine Wheel [5]. To restore health, the primary focus and concerns for treatment are placed on the 'immortal soul', which is symbolically placed at the center of the Medicine Wheel to foster balance among the body-mind-spirit-emotions components that compose each of the quadrants [5]. Another perspective Native American medicine people hold in common is that all diseases begin and end in the spirit of the person [13]. Spiritual healing involves concepts from non-ordinary reality (e.g., clearance of blocking, negative, or intrusive energies, soul retrieval lost during trauma or illness) and ordinary reality [13]. As such, elements from both realities and internal characteristics specific to the individual, such as thoughts, may function as etiologic factors and features of healing modalities [13].

Native American healers or medicine people can be male or female, and treatment is typically grouped in two categories. Treatment in the first category may include moving patients from an ordinary to a non-ordinary reality by conducting ritual ceremonies similar to other

shamanic traditions [11] or ones specific to Native Americans, such as vision quest, sweat lodge, and Plains Native Sundance [16], and by communicating between realities with sand painting, smudging and use of medicinal herbs, or direct interaction with patients through psychological counseling or laying on of hands [3]. Treatment in the second category requires working directly with the patient's spirit in the non-ordinary reality, retrieving missing pieces of the spirit to regain health [3]. Medicine people use sacred tools, such as a carpet, quartz crystal, feather, rattle, or drum, as protectors or facilitators when 'traveling' between realities [3]. Native American medicine people acknowledge the self-healing capabilities of patients and consider themselves a catalyst that facilitates communication between the two realities for healing. Medicine people usually enter an altered state of consciousness for treatment, but they can treat patients in ordinary or altered states of consciousness and recognise that patients have to put great faith and trust in the tools that are used [3].

Still lived among the Shawnee, whose name means 'Southerners'. They had a traditional economy based on farming (corn, beans, and squash), hunting, and gathering of wild plants. As was common among hunting tribes, spirituality was an important part of hunting and was expressed through the Native American belief in animism [17]. To maintain harmony between humans and the animal spirits and between humans and the plant spirits, it was necessary to conduct certain rituals to keep the world in balance, including sacred medicine bundles and dance ceremonies, such as Bread, Green Corn, and Buffalo Dances, that are related to important hunting or farming periods during the year [17]. The belief in an immortal soul and its predominance over the physical body were expressed during funeral rites, too. Before burial, the body was dressed, painted, and sprinkled with sacred tobacco, allowing the soul to leave the physical body [17].

Native American healing traditions and Still's views on religion and spirituality

Over time, Still presented himself as 'bonesetter' and 'magnetic healer', and his attraction to magnetic healing was tied to his evolving religious beliefs [18]. Although raised a Methodist, by the time he arrived in Kirksville, Missouri, Still was a spiritualist, which is a person who believes the living can communicate with the dead [18]. In addition to magnetic healing, other theories and movements, such as phrenology in the form of phrenomagnetism and Swedenborgianism, influenced him in the development of his new way of treating patients without medicinal drugs [19,20].

In 1851, Still's parents were transferred by the Methodist church to the Wakarusa Shawnee Indian Mission in eastern Kansas. Still and his family moved with them. There, he farmed and learned the Shawnee language while assisting his father in providing medical care to the tribe [19]. Materials from the Museum of Osteopathic Medicine in Kirksville, Missouri (USA) suggest Still was exposed to Native American traditional healing methods. Below one of his pictures, he added the handwritten note *Hoconethowa*, which is the Shawnee word for doctor (Fig. 3) and may have been referring to himself as a Native American traditional healer or as a Western healer. Either of these interpretations are possible since *Hoconethowa* may be used for both these meanings. He also had a sacred Navajo carpet to cover his treatment table (Fig. 2), a tool typically given by a Native American traditional healer to another one [3]. Still wrote several texts on health, disease, and his philosophical stance on both. Some are replete with religious overtones [21] and could now be understood from another angle as they may refer to non-ordinary reality elements, such as that described by Native American healers.

Key concepts from Native American spirituality and healing practices were used by Still when describing the emerging osteopathic profession in the context of existing medical practices [6]. He mentioned that patients have self-healing capacities and a body-mind-spirit connection, stressed the importance of the spiritual component for



Fig. 3. Picture of A.T. Still showing his handwritten note of *Hoconethowa*, the Shawnee word for doctor. Museum of Osteopathic Medicine, Kirksville, Missouri, USA [2008.81.01].

treatments that encompass the belief in the immortality of the soul, and focused on restoring health versus defeating pathology and on multifactorial versus reductionistic etiology. However, important differences exist between Native American and osteopathic healing practices (Table 1). The primary target for treatments is one difference: Native American healers target the spiritual component while osteopathic practitioners have until recently targeted the physical body through touch-based techniques. Consequently, no techniques used by Native Americans to promote a patient's non-ordinary reality have been formally included in osteopathic practices, where patients remain in the ordinary reality. The therapeutic context is also different between these healing practices, but spiritual and religious dimensions have to be considered through the lens of Western societies where understanding of human experiences have been mostly shaped by philosophy and science [23]. Native American healers and patients share the same cosmogony [15]; therefore, patients fully rely on the healers because they trust and recognise the healers as the only ones able to help them [3]. Conversely, osteopathic principles promote patient autonomy and foster active input from patients during treatment, so they do not exclusively rely on the therapeutic actions of the practitioner [21]. In practice, however, osteopathic practitioners sometimes assume the role of a 'treater', taking away patient autonomy [24].

While it is likely that Still was inspired by Native American spirituality and healing practices, he had many other influences [18] and interpretations of medical, traditional, and spiritual healing principles that were common in the Midwestern United States at the end of the 19th century. The current commentary is not intended to be strictly

Table 1

Comparison of traditional Native American and shamanic healing practices, osteopathy and osteopathic medicine, and modern Western allopathic medicine principles (adapted from Struthers et al. [22]).

Traditional Native American and Shamanic Healing Practices	Osteopathy and Osteopathic Medicine	Modern Western Allopathic Medicine
Sacred medicine	Secular medicine	Secular medicine
Spiritual framework	Systemic framework	Analytic framework
Dynamic interaction between body, mind, spirit, and emotions; holistic approach	Dynamic interaction between body, mind, and spirit; holistic approach	Reductionist approach
Emphasis on health and harmony	Emphasis on health with a focus on proper musculoskeletal system function to resist disease processes	Emphasis on disease and curing
Oral transmission from a traditional healer to another	Oral transmission from an osteopathic practitioner to another for manual skills Osteopathic practitioner applying evidence-based practice	Physician applying evidence-based practice
Traditional healer teaches patients to heal themselves	Osteopathic practitioner teaches patients to have the primary responsibility for their health	Physician teaches patients how to be disease-free and symptom-free
Patient's tribal beliefs of health and illness used along with physical, social, and spiritual data to make diagnosis	Reductionist data (biochemical, physiologic, anatomic, laboratory data) and manual assessment of the musculoskeletal system used to make diagnosis within a biopsychosocial framework	Reductionist data (biochemical, physiologic, anatomic, laboratory data) used to make diagnosis within a biomedical framework
History, physical examination, and family assessment used along with treatment plan	History, physical examination with a focus on the musculoskeletal system, and laboratory data used along with treatment plan	History, physical examination, and laboratory data used along with treatment plan
Honors the patient for the maintenance of health and recovery from disease	Honors the patient for the maintenance of health and recovery from disease	Honors the physician for curing
Preventive medicine taught to patient and family within a community and environmental framework	Preventive medicine taught to patient and family within a biopsychosocial framework	Preventive medicine taught to patient and family within a biomedical framework
Herbal medicine from nature may be used	Manual treatments are used and pharmaceuticals may be used (only for US osteopathic physicians)	Pharmaceuticals may be used
Use of manual techniques within a body-mind-spirit-emotions framework * to improve overall well-being	Use of manual techniques within a body-mind-spirit framework * to improve range of motion and decrease pain and associated psychosocial components * patients treated in the ordinary reality * channels for therapeutic information: 'direct-intuitive-nonlocal' or 'perceptual-cognitive-symbolic'	Use of manual techniques within a body-mind framework * to improve range of motion and decrease pain * patients treated in the ordinary reality * channel for therapeutic information: 'perceptual-cognitive-symbolic'

historical, so we have not attempted to capture complex nuances, people, meanings, events, and ideas of the past that influence and shape the present [25]. Such a task would be outside of our scope and require methods specifically applicable to osteopathy [20]. Documentation already exists describing Still's potential influences from theological, medical, alternative medical, spiritual, sociological, and demographic movements in the development and evolution of osteopathic principles and practices [20]. To date, Native American healing traditions have not been included. Even though those traditions rely on oral transmission rather than written documentation [3], the few materials presented in the current commentary may portray Still as Native American traditional healer or as a Western healer, i.e., a medical doctor, who was well accepted and integrated in a Native American tribe. Therefore, we encourage historical researchers to methodologically [20] investigate the period when Still was living among the Shawnee and document to what extent he was acquainted with their healing methods.

Still did not record a specific list of osteopathic principles and practices, so a historical framework was developed to understand the evolution of osteopathic principles and practices over three periods: original (1874–1910), traditional (1910–1953), and modern (1953–present) [26]. Regarding the commonalities between Native American and osteopathic principles, our commentary specifically focuses on the body-mind-spirit paradigm described by Still that disappeared during

the traditional period and was reintroduced in 2002 [7] during the modern period [26].

Body-mind and body-mind-spirit paradigms for osteopathic principles and practice

In 2002, Rogers et al. [7] proposed updated definitions of osteopathic principles and expanded the dualistic division of body and mind. However, instead of stating that a person is a unit, they attempted to define what constitutes a person and included 'spirit' in that definition [21]. Both body-mind and body-mind-spirit medicines have been previously defined [8] and may have potential implications for current osteopathic principles. A body-mind approach implies integration of modern scientific medicine, psychology, nutrition, exercise physiology, and belief to enhance the natural healing capacities of the body and mind with an end result of self-care [8]. A body-mind-spirit approach uses art and science in pursuit of optimal health rather than the absence of sickness [8]. It is characterized by a philosophical commitment to whole-person care and embraces the entire individual. In this approach, each person is considered an integration of physical, psychological, intellectual, and spiritual aspects that are equally important for health [8]. Body-mind-spirit medicine draws on diverse disciplines, including neurobiology, developmental psychology, behavioral medicine, and spiritual healing [8]. Thus, manipulative techniques may be used

within different frameworks to improve range of motion, to decrease pain and associated psychosocial components, or to improve overall well-being (Table 1).

Frecka and Luna [11] proposed a model to describe the two realities, i.e., the ordinary and the non-ordinary, where shamans could treat patients and where therapeutic information would be processed through two channels. The first channel is 'perceptual-cognitive-symbolic', which represents ordinary reality [11]. It relies on sensory perception, cognitive processing, and symbolic (visual, verbal, and logical language) mediation. Its main purpose is task solving and, thus, it exemplifies the typical Western scientific thinking of allopathic medicine [11]. The second channel is 'direct-intuitive-nonlocal', which represents non-ordinary reality. It was introduced for a possible ontological interpretation of traditional medicine treatments. As such, it provides a direct experience with no subject-object split and is unbound by language or other symbols [1,11].

The two channels for therapeutic information have descriptive applicability for Native American healing methods applied in both realities and, potentially, for osteopathic manipulative techniques applied solely in the ordinary reality. Information would be processed through a 'perceptual-cognitive-symbolic' approach, a characteristic of ordinary reality, in an osteopathic body-mind paradigm [11]. Current evidence-based models for manual clinical and therapeutic practice are shaped by pain mechanisms and neuroscience commonalities [27,28]. Therefore, practitioners from different professions may use the same manual technique after using a similar clinical algorithm. As an example, a recent review of the physiologic and biomechanics effects associated with cervical manipulation focused on chiropractic and osteopathic during the search process [29], but the evidence-based clinical information obtained is likely applicable to all other manual professions.

Therapeutic information would be processed through a 'direct-intuitive-nonlocal' approach, a characteristic of non-ordinary reality, in an osteopathic body-mind-spirit paradigm. As an example, practitioners would use manual techniques similar to laying on of hands described by Native American healers that address the spiritual component of the patient's health [11]. From a neurological perspective, laying on of hands techniques can be described as the use of gentle/affective touch on peripheral tissues to alter interoceptive pathways and theoretically modify sensitization states [30]. One example may be the biodynamic model of osteopathy in the cranial field, a vitalistic model influenced by Sutherland's theories [31]. According to McPartland and Skinner [32] p. 30], 'this model does not work with "energy" but with the consciousness of the natural world', and 'what is observed during treatment is not the result of mesmerism, coloured by a vaguely vitalistic theory, but evidence of a precisely organised natural system that requires discipline and dedication to develop the practitioner's perceptual faculty'. While the willingness to describe osteopathic experiences should be encouraged, practitioners should be careful with their descriptions because misuse of metaphors in medicine can be potentially harmful [33]. Instead, practitioners should use scientific terminology based on current scientific models [34]. To describe osteopathic palpatory experiences in the body-mind-spirit paradigm, descriptive terms such as 'direct-intuitive-nonlocal' should be preferred.

The inclusion of the body-mind-spirit paradigm in the updated osteopathic principles from 2002 [7] reflects a holistic approach of healthcare originally described by Native Americans [3] and incorporated into Western medicine by Still [6]. Evans [21] suggested this inclusion reflected the growing body of evidence supporting a biopsychosocial (BPS) approach to healthcare, which shares many features of holism. Since pain results from interplay of mechanical, biochemical, psychological, and social factors, guidelines for the management of musculoskeletal pain recommend using a BPS model [35] (Table 1). Previous holistic osteopathic models included a variety of contributing factors to address patient symptoms, such as Fryette's total osteopathic lesion model [36], but they did not provide information about prognosis or possible management options apart from hands-on

management. Smith [37] proposed a model for an osteopathic BPS approach that included spiritual needs. This approach would incorporate empathetic listening, investigate meaning and purpose and their impact on symptoms, integrate pain-related beliefs into cognitive behavioural therapy, use personal spiritual practice as part of treatment, and explore connections with others. Incorporating religion and spirituality dimensions into Western medicine may foster a more holistic, ethical, and compassionate practice of medicine [38]. However, because those dimensions are part of traditional medicines and esoteric healing traditions [1], some Western practitioners may be reluctant to include them in patient care [39]. Recently, a care package combining osteopathy, secular mindfulness, and acceptance and commitment therapy known as the Osteopathy, Mindfulness and Acceptance-based Programme (OsteoMAP) was designed to maximise the therapeutic advantages of physical, psychological, and spiritual therapeutic interventions [40]. The OsteoMAP pilot study showed this innovative combination of evidence-based treatments was feasible and well received, and it had some beneficial effects [40].

Thus, the proposed osteopathic principles from 2002 [7] border traditional healing methods and a modern evidence-based approach. As such, they offer the osteopathic profession a unique opportunity to promote a scientific paradigm of holistic care that encompasses both body-mind and body-mind-spirit approaches.

Conclusion: A possible scientific paradigm to encompass osteopathic principles and practices

Modern and holistic musculoskeletal practice should provide an evidence-based practice that addresses all patient needs, including religious and spiritual dimensions as part of the body-mind-spirit paradigm [37]. Clinical models have been proposed to address these dimensions in musculoskeletal practice and are based on questions shamans ask to develop a diagnosis [41]. However, these models may represent a simplistic Western view that includes an unhelpful cultural reductionism of shamanic traditions that have to be contextualized within their specific cosmogony [23] (Table 1). Therefore, a more prudent approach is recommended when referring to shamanic traditions as descriptors of what remains unknown in Western medicine. Instead, incorporation of these traditions into Western musculoskeletal practice should be limited to scientific models that address religious and spiritual dimensions in professional and ethical ways.

Currently, body-mind-spirit concepts in medicine are being investigated in the field of psychoneuroimmunology, which studies the effects of thoughts, emotions, and mental state on health [8]. According to the Frecka and Luna [11] model, when the coping capability of 'perceptual-cognitive-symbolic' processing is exhausted during induced states of altered consciousness, a frame shift from the ordinary to the non-ordinary reality occurs through a 'direct-intuitive-nonlocal' channel, and patients access a spiritual multidimensional reality. Cognitive neuroscience and, specifically, the computational model of brain predictive processing offer powerful tools to directly investigate the neurocognitive basis of religious and spiritual experiences that occur in altered states of consciousness [12]. In general, humans use cognitive models based on previous experiences to predict and perceive the world, and these models are updated when individuals are presented with conflicting predictions or sensory information. Interestingly, this process may describe what is occurring in the brain of an individual in the non-ordinary reality [12]. Recently, van Elk and Aleman [12] proposed a brain predictive processing framework that has the potential to account for the emergence of religious visions and hallucinations, mystical experiences, personal experiences of God, and the acceptance and maintenance of religious beliefs.

The body-mind-spirit paradigm of health, derived from key Native American healing principles, shapes current osteopathic principles and practices [7]. Recent advances in the neurosciences may offer theoretical frameworks that encompass the rich variety of osteopathic

practices with the two characteristics of therapeutic information processing described by ordinary and non-ordinary realities [11]. Further, the neurosciences may offer other theoretical frameworks for the spiritual component of the body-mind-spirit paradigm through a predictive processing model that describes the spiritual experiences of patients in altered states of consciousness [12]. While osteopathic patients remain in the ordinary reality during treatment, descriptive models for shamanic healing of patients in the non-ordinary reality may have some applicability for osteopathic manipulative techniques because those models include a patient's spiritual component. Although these integrative neuroscience models look appealing as a support for clinical interpretations of osteopathic principles and practices, they will remain purely theoretical unless formally tested.

The following quote from Still's autobiography nicely summarizes two key points of the current commentary:

When I looked up the subject and tried to acquaint myself with the works of God, or the unknowable as some call Him, Jehovah as another class say, or as the Shawnee Indian calls Him, the great Illnoywa Tapamalaqua, which signifies the life and mind of the living God, I wanted some part that my mind could comprehend. I began to study what part I should take up first to investigate the truths of nature, and place them down as scientific facts [2 p. 295].

First, Still seems to suggest that the spiritual beliefs of the Shawnee were similar to others, a viewpoint that has not been explicitly described before, highlighting a universal message of tolerance. Second, spiritual and scientific understanding were growing in tandem. Thus, with its traditional medicine heritage and current evidence-based approach, the osteopathic profession is in a unique position to promote the scientific model of holistic care.

Declaration of competing interest

Rafael Zegarri-Parodi reports a competing interest because he is on the editorial member of the editorial board of the *International Journal of Osteopathic Medicine*. However, he had no role in the review or decision making associated with this manuscript. Jerry Draper-Rodi, Jason Haxton, and Francesco Cerritelli declare there no conflict of interest.

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