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Osteopathic care of patients with persistent physical symptoms: an enactive-ecological framework

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Osteopathy recognises that each patient's clinical signs and symptoms are the consequences of the interaction of multiple physical and non-physical factors. Osteopathy emphasises the importance of the patient-practitioner relationship in the therapeutic process and can therefore be regarded as a person-centred approach to healthcare. Person-centred care requires a solid therapeutic alliance, which is influenced by biopsychosocial factors (Miciak et al., 2018; Søndenå, Dalusio-King and Hebron, 2020). An effective therapeutic alliance enables osteopaths to assist patients in making sense of their illness experiences by developing new body narratives about their altered or changing physical capacities (Gale, 2011). Despite the claimed person-centeredness of osteopathic care, clinicians have traditionally focused on cause-effect body-centred care models (Esteves et al., 2020). Here, I summarise the arguments presented at the keynote that I had the privilege to deliver at the Norwegian Osteopathic Association meeting in Oslo on 13th November. I build upon the challenges and opportunities to provide effective person-centred osteopathic care to propose a reconceptualization of osteopathic care under the enactive and active inference framework –underpinned by a robust therapeutic alliance, osteopaths help patients make sense of their illness experiences by creating new body narratives about their changed or changing physical capacities and ensuing effects on their identity, relationship with their environment and meaning in their lives (Esteves et al., under review).

We possess an ever-changing capacity to adapt to our environment. Each one of us creates our own Umwelt (an environment or "life-world" that is unique to us) as a combined creature-environment "bubble" out of those features perceived to be uniquely relevant to its purposes (Tyreman, 2018). The dynamical interplay of causal factors, the person and their own Umwelt predict illness and dysfunction difficult–attributing cause and effect can be highly challenging. Osteopaths should consider their patients as a dynamic, complex adaptive system. Osteopathy cannot simply be conceptualised as a body-centred intervention informed by aetiological models of care: human functioning is complex, unique to the person and unpredictable. Instead of considering their individual patient's clinical presentation as a set of complex aetiological cause-effect relationships, health and disease should be seen concerning life and the person within their environment (Hoover, 1963; Tyreman, 2018). Osteopaths should therefore evaluate the person seeking care within an inconstant ecological system (Tyreman, 2018).

Despite proposals to frame osteopathy as ecological medicine (Hoover, 1963)–osteopaths have long focused on the fallacy that removing a structural cause of dysfunction could cure disease. This aetiological model is, for many, an attractive way of approximating osteopathy from orthodox medicine. However, it has been argued that it is far from what Andrew Taylor Still originally envisaged for osteopathy–a way of addressing changes that interfered with an individual's function and their impact on their activities of daily living (Hoover, 1963). In recent years, several attempts have been made to move away from heavy reliance on aetiological structure-function models of care by endorsing the biopsychosocial model as the foundation for person-centred osteopathic care (Penney, 2013; Thomson, Petty and Moore, 2013;

Esteves et al., 2020). Despite the centrality of the biopsychosocial model in contemporary healthcare practice, the model does have its limitations. It has been argued that the biopsychosocial model has been bio-medicalised, lacks a framework that integrates all dimensions in a non-reductionist manner, and it fails to show how its dimensions interrelate (Stilwell and Harman, 2019; de Haan, 2020). An enactive approach to acute and chronic pain and mental health disorders has been proposed to address these limitations (Stilwell and Harman, 2019; de Haan, 2020; Coninx and Stilwell, 2021). In line with these developments, we have also recently proposed enactivism as a robust framework to underpin the development of an integrative model for person-centred care in osteopathy (Bohlen et al., 2021; Zegarra-Parodi et al., 2021; Esteves et al., under review).

According to enactivism, cognition and perception develop due to a dynamic interaction between an acting organism and its environmental constraints, referred to as affordances (Thompson, 2010; Tschacher, Giersch and Friston, 2017)–affordances are opportunities for action, e.g., a door for opening or a ball for catching, rather than an action-independent representation of the 'way things are' (Seth, 2021). Therefore, the mind, body, and environment are highly interdependent elements of an ecological system (Tschacher, Giersch and Friston, 2017). A fundamental notion of enactivism is sense-making–the evaluative interaction of an organism with its environment (de Haan, 2020). Recently, Stilwell and Harman (2019) have proposed that pain should be regarded as a relational and emergent process of sense-making through a lived body, which cannot be separated from the world that we shape and that shapes us. Interestingly, Littlejohn (1905), in his early conceptual framework for osteopathy, focused on the functional adaptation of the body in relation to the external environment. He viewed osteopathy as person-centred care, which is based on four key pillars: adaptation, function, environment and immunity (Gevitz, 1982). Although many of these early osteopathic care concepts were lost to a predominantly cause-effect disease-based model, we argue that these ideas can be reconciled under the Free Energy Principle (FEP) and the enactivist and active inference frameworks.

The FEP explains how dynamic adaptive systems maintain their integrity, i.e., non-equilibrium steady-state, by restricting themselves to a limited number of characteristic states (Hipolito, 2019). Any adaptive change made by an organism or biological system must minimise its long-term average surprise, where surprise scores the implausibility of a system being in a particular state (e.g., it would be surprising to find a fish out of water). Clinically, this mandates the mitigation of unpredicted and uncharacteristic sensations (Edwards et al., 2012). The long-term average of surprise is associated with the entropy (dispersion) of sensations: a failure to minimise surprise would therefore lead to an unbounded increase in entropy (sensory disorder) and dissolution of self-organisation and consequent homeostasis (Edwards et al., 2012). Living systems typically resist a natural tendency to disorder by minimising surprise and uncertainty by acting on the world and updating their internal states–through active inference (Friston, 2009; Ramstead et al., 2019). This active inference can be read as se-

lecting the most likely course of action under an internal narrative or generative model of the world (and body) that covers the consequences of action. A breakdown in adaptive capacity of the person seeking care due to an inflexible or distorted updating of such models will lead to illness. A robust therapeutic alliance may be necessary for healthy adaptation–by facilitating a revision of their generative model or narrative that renders it apt for changes in their world (and body).
While the body 'disappears' in states of health and wellbeing, it typically 'reappears' at times of pain and dysfunction (Leder, 1990, p. 4). Therefore, physical or emotional pain affects the very foundation on which the sense of self rests (Arika, 2019). The physiological arousal, which occurs in persistent pain and other persistent physical symptoms, prompts the individual to focus attention on their body (Van den Bergh et al., 2017). In this context, pain and other physical symptoms should be viewed as an action problem–when a nociceptive signal travels up from the periphery via the spinal cord; it presents the brain with the question, "what is to be done"? (Morrison, Perini and Dunham, 2013). The nervous system is organised to anticipate potential pain and adjust behaviour before tissue damage becomes critical. Regulatory processes occur dynamically at different levels and in a Bayesian way, i.e., using previous experiences as they are represented in the brain as an estimate of the likelihood that a specific clinical condition applies (Morrison, Perini and Dunham, 2013; Van den Bergh, Zacharioudakis and Petersen, 2018). A critical point in cases of pain and dysfunction is that the body does not simply become 'visible'–it becomes the focus of attention. This selective attention to the body disrupts the individual's ability to interact with the environment and others, i.e., their sense of agency. Arguably, illness becomes a loss of agency–the person's inability to perform goal-oriented actions in the usual expected way marks the beginning of becoming a patient. In predictive processing formulations of active inference, the deployment of attention is generally thought of as covert action. Many active inference formulations of chronic pain emphasise this attentional aspect. Chronic pain represents the hypothesis "I am in pain"–a hypothesis that is verified by selectively attending to appropriate sources of sensory evidence; primarily, in the interoceptive and nociceptive domain. Expressed in this way, therapeutic revision of a self-model rests on exploring alternative hypotheses (i.e., self-models) that generate a different attentional set–and a different precision weighting of prediction errors.

On this view, pain and 'illness' are not attributes of sensations, but they are carefully crafted narratives over long periods of suffering and engagement with one's body and healthcare practitioner. They are the best explanations at hand for what one is experiencing. When one thinks of pain or dysfunction, it is not the content and prior beliefs that underwrite their commitment to their narrative that they suffer from chronic pain. Instead, it is the fact that they cannot attend away from the information or the sensory evidence that must be explained in that way (Edwards et al., 2012). Individuals with persistent pain and other physical symptoms are unable to ignore, attend away or attenuate selectively different sources of sensory evidence to deploy precision in the context of selective attention or to attenuate or augment it in the context of sensory attenuation (Friston, 2009; Edwards et al., 2012; Pareés et al., 2014).

Osteopathic care can be considered in terms of inference about others, based on the notion that we model and predict our sensations–sensations that other agents like ourselves generate. This viewpoint leads to osteopathic care based on a generative model or narrative shared by agents who exchange sensory signals. The dyadic or participatory sense-making process is informed by selectively attending and attenuating sensory information. Attending to interoceptive, exteroceptive and proprioceptive sensations enables agents to predict each other's sensory input. Conversely, attenuating relevant interoceptive and exteroceptive input enables one to articulate the narrative by realising proprioceptive predictions (e.g., movement). The mental states–hidden states of patients are not observable, and they need to be inferred, and, arguably, osteopaths achieve this through communication, touch, movement and exercise. In the keynote presentation, I proposed a reconceptualization of osteopathy under the enactive and active inference framework to provide a rationale and future directions for the broader concept of psychologically-informed osteopathic care. Arguably, this offers an integrative framework for osteopathy, which can evince the mechanisms underpinning dyadic exchanges and osteopathic care outcomes. As an ecological niche, the patient-practitioner dyad provides the osteopath and the patient with a set of affordances that can promote adaptations and restoration of productive selfhood. The clinical encounter provides opportunities to identify maladaptive priors and beliefs and implement strategies to engage with the world as participatory sense-making.

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