Dis-embodiment and persistent pain – a matter of maladaptive attention?

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A vast body of knowledge has been collected about how nervous-, immune- and stress systems work together to maintain and restore homoeostasis when a person's integrity has been challenged. While allostatic processes work continuously beneath consciousness, stressors can build up and overwhelm these systems subliminally until they can no longer be ignored. Consequently, a more helpful narrative could view pain as a call for action when automatic systems can no longer compensate.

Movement based therapies have long set the benchmark for attaining physical and emotional well-being. They foster awareness for proprioceptive (movement of the body in space), interoceptive (perception of the internal body) and exteroceptive (external environment) information. Having a good understanding of stressors that could arise in these domains is essential to adequately manage allostatic load.

Intero- as well as proprioceptive awareness can be distorted when a person is experiencing significant stressors. It can be hard to discern the meaning of sensations in the body and mindful movement strategies could be a useful means to attune the conscious mind through curious attention to interoceptive experiences. This process is called 'embodied cognitions' and can be used to rebuild a more helpful relationship to one's body. As a consequence, it can foster acceptance of sensations, reduce fear and improve an individual's sense of agency over their body and how to interact with the world.

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Introduction

Pain is designed to interrupt our present moment cognitions and actions. It urges one to act, to impose a new priority to escape and protect; to minimise damage and restore homeostasis when our bio-psycho-social (and spiritual) system is being challenged [1; 2; 3]. Persistent pain is however a situation where the source of the pain cannot simply be removed, and escape is not possible. It can feel like living in an unsafe environment and this fuels difficulties with attentional bias e.g. fear avoidance model, [4]. In a review of attentional bias for anxiety disorders, Cisler & Costa [5] proposed three observable components; 1. facilitation of attention to threat (attention being drawn toward threat), delayed disengagement from threat ("the degree to which a threat stimulus captures attention and impairs switching attention from the threat to another stimulus" (p. 208) and attentional avoidance (attention being drawn away from a threat, often as a self-regulatory attempt). These processes can also be seen in people's experiences living with persistent pain [6].

As humans we seek to understand the meaning of any experience, e.g. potential threat that pain poses [7]. One learns to be more aware of any signals of danger, which are enhanced by cognitive processes such as catastrophising and attentional bias described above [8; 5]. A common attempt to escape from this can be dissociation from the conscious awareness of this experience. Dissociation also prevents individuals from being present and aware of other positive and meaningful experiences, which could potentially help with coping [9; 2]. Over time, unhelpful beliefs (e.g. fear avoidance) become reinforced and eventually, can result in inflexible core beliefs (or schemas) that are difficult to shift. This signals the importance and potential benefits of improving awareness and attention as a focus of treatment given its central contribution to pain maintenance and pain-related disability.

One of the difficulties encountered by individuals experiencing persistent pain as a result of injury or illness, is an identity loss, including a change in connection to, and agency over one's body [10; 11]. In a recent study by Moore et al [12], thirty-four people were interviewed on their experiences of and relationship to their knee following a total knee replacement. Two themes included the idea of alienation from the knee, with participants describing a lack of felt connection to the knee or a sense of otherness, which suggests a disruption between body and self. There was also a felt loss of "conscious connection", whereby some participants described a loss of agency or control over their knee, e.g. a knee which could give way without warning and result in a fall. This so-called "disembodiment", loss of connection from the body or parts of the body, is an adaptive psychological mechanism in order to attain relief from suffering and the desire of distancing the self from a part of the body that involves an obstacle or damage to the self. In an earlier qualitative study by Afrell et al [13], the idea of two alternating pathways of living with pain were apparent. In both cases, it was clear that the painful body had become part of the subject's identity, however, for one group

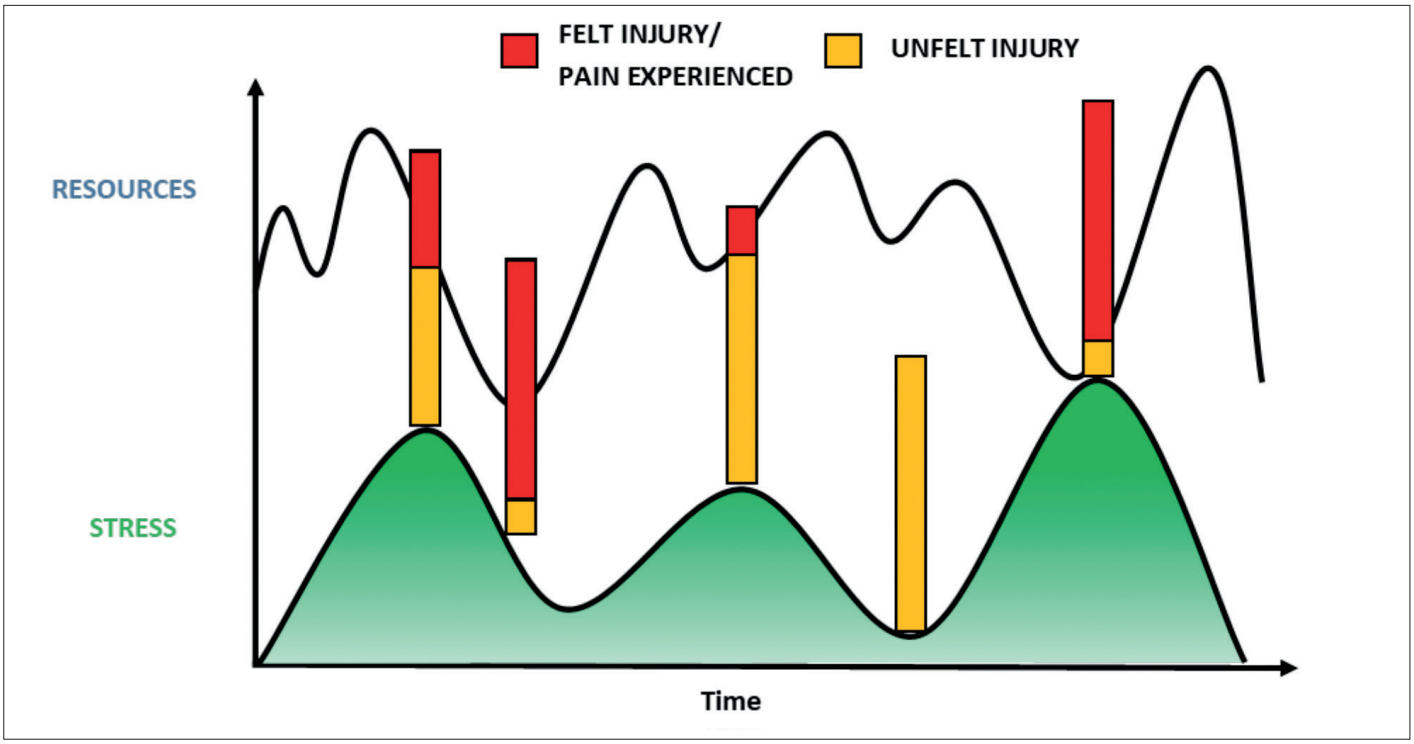

Figure 1: Black line = Level of resources, **Amount in green** = Stress, **Red box** = Pain – amount experienced, **Yellow box** = Pain – unfelt injury, **Red and Yellow box** = Amount of tissue damage, which for the purpose of the exercise remains consistent

there was acceptance and a willingness to listen and learn from the body, whereas in the second there was ambivalence or rejection of the body. For the first group there was a transition from a lack of bodily awareness to seeing the body as "a speaking partner and a teacher." Reinforcing or re-establishing body awareness and body reliance may be a possible way forward.

The relationship between pain and injury

The International Association of Pain (IASP) defines pain as: "An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage" [14]. From this definition it can be concluded that pain is not an exclusive signal of something going wrong in our bodies or simply an accurate measure of any or the amount of tissue damage. Many things can affect a person's integrity including biological, psychological or social stressors. Awareness of anything that threatens our integrity is the first step in change and progress. Once awareness has been established it can assist in self-regulation, both physiologically and psycho-emotionally. The use of the term "Integrity" in this article refers to a state of wholeness or completeness in a sense of "remaining true to oneself". If something is not sitting right within our system, be it physically, mentally or socially, it can cause disruption and disconnection [15].

The idea that we have systems in place that will always work on our behalf to counterbalance any blip that disturbs physical or mental well-being should be comforting. Does that mean that one can simply relax and allow nature to take on its healing course?! The reality in the clinic seems to suggest otherwise.

Homoeostasis – Allostasis – Resilience

The father of Stress, Hans Seyle, said, *"Stress is life and life is stress"*. [16] From Seyle's categorical statement, the question of how people cope with those seemingly unavoidable stressors arises. Figure 1 (▲) describes 5 different scenarios in which the same amount of tissue injury can cause no pain, intense pain or varying intensities depending on a) the occurrence of additional biological, psychological or social stressors going on at the same time and b) the amount of available biological, psychological or social resources at the time.

Therefore, *"dynamic homeostasis means that whenever a part of the system is out of balance, the rest of the members of the system will try to bring it back into balance."* (John Bradshaw, 1933–2016). However, this is not always the case. While allostasis refers to a protective process that aims to achieve stability to changing social and physical environments, an increased or prolonged allostatic load/overload can result in overuse of homeostatic systems (wear & tear on body and brain). This can lead to an imbalance of neural circuitry for cognition, decision making, and mood as well as a disruption to systemic physiology via neuroendocrine, autonomic, immune and metabolic mediators. persistent activation of the amygdala can shut down other areas of the pain, including the frontal lobe, which are critical to language, perception and awareness. Our abilities to notice, take a step back and perceive alternate helpful realities are diminished [9].

Bradshaw also stated that *"We cannot heal what we cannot feel."* Could this be one potential explanation for the development of an allostatic overload? Consequently, could improving interoceptive communication between the body and the brain foster self-regulation, dynamic homeostasis and resilience to stressors?

Interoception

Interoception is the perception of the state of the body. However, there is currently no consensus on an exact definition of interoception [17]. While proprioception

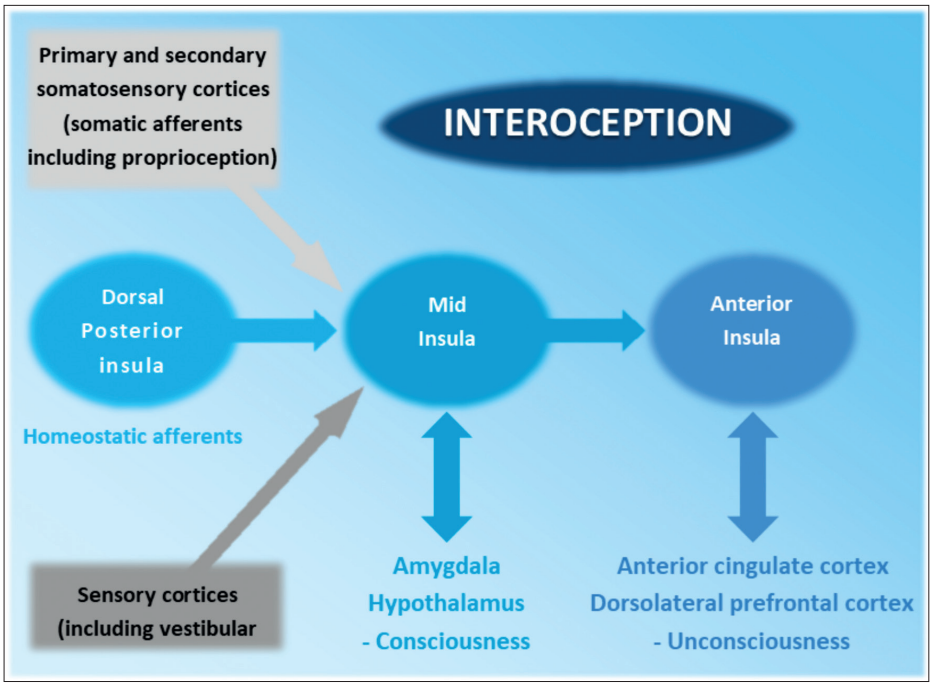

Figure 2: Anatomy of Interoception – Insula as the seat of interoception [adapted from 19]

is defined as the experience of body position and movement, relative to other body parts, external objects and factors such as gravity, interoception informs the brain about the existence of a body part and how it feels. If either ability is diminished, it will influence the other [18].

Interoceptive awareness requires a multimodal integration of sensation, learning, memories, and emotions, and as such, does not merely represent the raw data of sensory signals from the body. Interoception is an experience; thus, it will also be influenced by past experiences and predictions of future experiences. Interoceptive experiences can be amplified by cognitions, especially when the person cannot discern the meaning or importance of something [3]. This can result in triggering fear or perceiving a lack of control over or distrust of the body. They can also be amplified by stimuli from the environment, e.g. observing facial expressions of others can affect processing of information about one's own body state, especially for pain. After a tissue trauma nociceptive signaling can be amplified through a state of heightened sensitivity or hypervigilance, leading to noticing even the smallest sensations that have previously gone unnoticed.

The anatomical pathways of interoception are linked to both conscious and unconscious brain circuits. Interoceptive fibres from the body terminate in the anterior part of the insular cortex, which is connected to the brainstem circuits (unconscious) but can also connect to the Prefrontal cortex (conscious). The insula, like the anterior cingulate cortex, has been shown to be more active when individuals focus on the state of their body. The dorsal posterior insula receives and processes signals about physiological processes that for the most part occur without our conscious involvement (homeostatic inputs), see Figure 2 (▲) [19].

Moment to moment, a phenomenal number of bodily processes are taking place outside of our awareness; from the breath delivering oxygen into the lungs to harmful germs being fought off and new cells being created in the body to allow us to engage in daily activities. This self-regulating capacity means that we can see the body as *"a living, everchanging source of intelligence, information and energy"* [p. 81, 20]. However, when we experience our body as an object of disappointment, fear, frustration or injury we can *"lose confidence in the innate intelligence of our own bodies"* (p. 81). We may view the body as something to be ignored, to be fixed or repaired, we may ignore pain or push past limits or fail to notice other signals of well-being or comfort ignoring the body's own intelligence and information.

Poor interoceptive awareness, such as unconscious body states have been shown to influence emotions, behaviour and decision making (e.g. "hangry" – leading to being snappy and pizza driven rage) and is frequently associated with persistent pain, negative emotions, anxiety, eating disorders, fatigue etc. If we don't understand what is going on in our bodies, it might also lead to holding unconscious muscular tension [17].

On the contrary, improved interoceptive awareness increases heart rate variability, increased vagal tone, presence, self-regulation and resilience. It allows the individual to have some choice about what the body can do, to develop a sense of agency over one's own existence, being present to what the body attunes to and using it as a guidance from within to interact with the world. As such an improved interoception leads to an improved Embodiment/Re-embodiment [17; 18].

Embodiment

Embodiment in the context of this article refers to the subjective experience of being in your body within the context of the environment around you. It can be representative of a state of mind or feeling, an idea or a quality. Western thinking has long been dominated by the concept that body and mind are separate and of the supremacy of the mind in our identity and experience of the world. The idea that our bodies contribute to our identity in the world has its origins in the philosophy of phenomenology. French philosopher Maurice Merleau-Ponty spoke about the idea of the body as object and as subject of our lived experience [21]. There is the 'objective body' that, like other physical objects, has a particular size, weight etc. and a 'subjective or lived body' through which we experience and interact with the world. In his words: *'I make my reality and find myself only in the act... It is not because I think I am, that I am. The whole certainty of love, hatred or will is that I perform them'* [21, p. 91ff].

Changes in the body, after an injury or an illness can hence lead to changes about our sense of self, our identity and our understanding of the world. The presence of pain can significantly reduce functional abilities, limit social roles and connections

Changing The Breath	Make your breath longer and smoother on each inhale and each exhale. Notice the pause in between each. Soften the breath as if you were softening a gripped muscle. Notice if anything changes in the ease of movement or the tension, discomfort or pain. Start observing the non pain sensations in your body, especially around the neck and shoulders. As you explore your sensations, notice more subtle sensations that you did not find at the beginning of the exercise.
Learning to Let Go	When noticing a sensation, painful or not, allow yourself to then let it go and move on to the next sensation. Allow yourself to stretch, take a break from the exercises and then come back to it. Invite micro-movements in your hands as you breathe and then let it go. Imagine watching yourself doing those simple movements, and once done, check with yourself again how it feels. Imagine the feeling of the movement, from the most obvious sensation to the most subtle sensation and imagine that the movement is easier now, and again check with yourself how you feel in your body. After this embodied practice, we know that pain can change.

Table 1: Examples of somatic exercise [18]

to one self and others, hence contributing to a state of dis-embodiment.

Therapeutic approaches to foster interoception/re-embodiment

One of the main approaches to manage pain and distress is to increase our awareness of our felt sense of the body and learn to regulate the sensory and emotional experiences we encounter [9]. Allowing ourselves to encounter pain and uncomfortable sensations and shift from fear to curiosity is also important so as to understand and address contributing factors to ongoing pain. The first step according to Levine & Phillips [9], is *"learning how to communicate with your body so that you can create a healing collaborative partnership....and shifting your body from (a) painful enemy to (an) invaluable resource"* (p. 6).

Improving interoception refers to becoming aware of bodily sensations, whereby improving discernment refers to the ability to judge well, e.g. regarding the importance or meaning of a sensation [18].

Re-connecting with the body can initially be frightening and overwhelming [20]. Allowing time and providing gentle encouragement toward this can be helpful. Awareness and understanding can lead to acceptance of disowned and feared body parts and allow for new adaptive patterns and behaviours to develop. Firstly addressing both fears and hopes for reconnecting to the body can be a useful exercise as can exploring verbally or in written form the ways in which the body is currently treated or related to and potential ways of shifting towards a healthier relationship [20].

An example of an invitational language to foster awareness could be "Notice sensations coming from your body, the painful and the non-painful one, notice which sensations are there.. If there is tension, try to find non-painful ones in the same area...". At the same time, practising discernment with questions such as "Is this really dangerous? Is this something more than a fleeting experience? What happens when I shift into being a detached witness?" is a key to fostering both interoception and empowerment of people to have ownership and control over their own lived experience [3].

Summary

In a life that is often hectic, unpredictable and filled with social pressures, pain and dissociation might occur as a protective strategy. Pain can become central to our reality and may end up defining a person's identity, that is *"I am the pain."* [9]. Pain can disrupt the accuracy of interoception such that an area of the body is experienced as "distorted" or nothing else can be felt in that area besides pain. Dissociation and poor interoception could be an expression of maladaptive attentional processes at play that facilitate identity loss and diminish the integrity of self. This can lead to a vicious cycle of perceived threat, fear, muscular tension, pain and more threats when a person's world collapses due to pain related disabilities [9; 23].

Poor discernment, such as being unable to understand sensations, can lead to fear of the affected body part, especially if these have previously gone unnoticed. As a consequence, dissociation (e.g. through neglect) might present itself as a well-intended yet flawed defensive mechanism to block out any (positive or negative) experiences, both on a somatic and emotional level, associated with the body.

Somatic exercises (**Table 1▲**) as well as mind-body exercises (e.g. Yoga, Feldenkrais) work with the body as a way for the person to "become whole and connected." An attitude of self-compas-

sion and understanding of one's own vulnerability can offer further useful avenues to improve interoception as a pathway to re-embodiment. Learning to self-regulate our physiology through breathing exercises, mindfulness, meditation and intention setting has been shown to be helpful in overcoming adverse situations and challenges [22; 23].

A gradual shift of someone's relationship to their bodily experiences could see someone shifting from "I am the pain" to "I am experiencing the pain" to "I am experiencing the sensations that are underneath the pain" by using selective adaptive attention and connectedness [9].

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