

# The neuroscience of the mind–body connection & psychosomatic issues

rough notes for workshop at BACP private practice conference 'Mind or Body – What's in Charge?', 28th September 2019

## questions

Do therapists (does anyone) have a good understanding of the science underlying the mind–body connection? What is the basis for the idea of psychosomatic illness?

## the mind–body connection

Brain and body work together. They affect each other via neural routes (nerves) and biochemical ones (hormones, peptides etc. in the bloodstream). In general, the brain initiates what happens in the body, and the body influences what happens in the brain (there are exceptions). To unravel the mind–body connection, we need to explore the details of what happens in either direction.

We also need to appreciate the differences between the left and right hemispheres, because the right is more inter–connected with the body than the left is. The right hemisphere:

- weaves together what's happening around us with what's happening within us (heart rate, breathing etc.), in the background, while the left focuses attention on whatever is in the foreground (e.g. what we want to say)
- triggers sympathetic arousal in the body and therefore the stress response
- has a more integrated mapping of the whole body, its surface and its interior, than the left has
- is where our felt sense of a situation arises

The left hemisphere sees mind and body as separate, the right sees them as working together as an ensemble. Left says "I have a body", right says "I am my body". We can think of a *foreground mind* in the left and a *background bodymind* in the right, and of our having a *right brain–body ensemble*. Because the right tends to be in the background, we project the wonders of its wholistic functioning into the apparently unsolved mysteries of the body e.g. 'the wisdom of the body' – such wisdom arises in the right hemisphere, informed by the body.

## mind–body anatomy and physiology

The *central nervous system* is the brain and spinal cord – well down into the body. The *peripheral nervous system* refers to nerves from brainstem and spinal cord to everywhere in the body.

The *autonomic nervous system* is the aspect of central and peripheral systems not under our conscious control e.g. heart rate, blood pressure, falling asleep. It divides into the *sympathetic nervous system* for arousal, energy, activity, stress etc., and the *parasympathetic nervous system* for rest, digestion, sleep etc.

*Motor nerves* transmit signals from brain to body to move a limb or increase heart rate etc., *sensory nerves* transmit signals from body to brain to inform the brain.

Biochemistry flows between brain and body in both directions: e.g. the *HPA axis* (hypothalamus–pituitary–adrenal) is a sequence of hormones that start in the brain and trigger the release of adrenaline and cortisol from the adrenal glands – it's the biochemical half of the stress response, the other half being the sympathetic nervous system. Biochemicals such as cortisol that enter the bloodstream get into the brain, and influence what happens there.

*Viscera* and *internal milieu* are the organs and fluids sloshing around inside the body. The right hemisphere's mapping of the body includes them.

The *immune system* comprises cells, e.g. white blood cells, all over the body and brain. Some are *macrophages* which 'eat' bacteria. *Lymphocytes* produce antibodies that help macrophages fight infection. Macrophages secrete proteins called *cytokines* that circulate in the bloodstream enlisting the help of other macrophages.

## **how body and brain affect each other**

The brain coordinates external sensory signals with the movement of limbs. It needs blood and oxygen from the body, and internal sensory signals so it knows what's going on in it.

Thoughts generate emotional body states, and body states change the neural landscape in the brain, e.g. a body made anxious by an anxious brain then biases the brain into further anxious thoughts (ensemble working).

Body mapping in the brain includes the five senses, the movement of muscles and limbs, the configuration of the body in space, and the state of the viscera and internal milieu. Mapping is dynamic, especially in the right hemisphere, as our internal somatic state is always in flux. This enables *interoception*, the sense of our body from within.

Body mapping means we have a body in our brain, sometimes leading to strange phenomena such as body dysmorphia whereby our perception of our body clearly (to others) differs from how it really is.

*The brain changes the body*: it evaluates sensory signals and initiates emotional changes in the body via neural and biochemical routes, e.g. the brain decides where in the body gets more blood and where gets less when, for example, we're stressed and anxious.

*The body changes the brain*: it influences how we feel and what we think about via neural and biochemical routes. Also, the immune system and inflammatory processes can cross the blood-brain barrier and affect the brain.

## **psychosomatic conditions**

*Jung*: "A wrong functioning of the psyche can do much to injure the body, just as conversely a bodily illness can affect the psyche; for psyche and body are not separate entities, but one and the same life." We can link psyche more with the right hemisphere than with the left.

Psychosomatic symptoms are physical symptoms that occur for psychological reasons (*O'Sullivan*). Serious symptoms mask emotional distress. In psychosomatic illnesses, the patient complains of *symptoms* that cause real distress and disability, but the doctor can't find the *signs* of illness. Psychosomatic illness is not a single illness with a single cause.

'Psychosomatic' is not a straightforward concept: the illness should originate in psychological distress rather than infection or injury, and the distress should be suppressed or dissociated rather than expressed (*Stauffer*). But distinguishing illnesses with psychological and physiological causes may be impossible (*Panksepp*). Maybe all illness has a psychological element, while no illness is purely psychological in origin.

*Somatization*: the tendency to have physical symptoms in response to stress or emotion, an almost normal feature of life in which the body expresses mental or emotional distress: we all somatise our emotions, whether we acknowledge it or not (*O'Sullivan*).

*Psychosomatic symptoms*: the two most common are fatigue and pain, which cannot be objectively measured (*O'Sullivan*). Plus: non-cardiac chest pain, pelvic or abdominal pain, painful peeing, shortness of breath, itching and rashes, blurring of vision, hearing loss. Psychosomatic symptoms can affect any part of the body, and involve palpitations, paralysis, convulsions, or almost any sort of disability. Every bodily function can malfunction, and any biochemical can be over-produced or under-produced. The behaviour surrounding the symptom is key, e.g. disproportionate worry, anxiety and excessive energy spent on health concerns.

*Psychosomatic disorders* include: fibromyalgia, some skin disorders, interstitial cystitis, most cases of IBS (*Kradin*). Illnesses linked to emotional suppression and poor affect regulation include asthma, heart disease, ulcerative colitis, back pain, tension headaches, intestinal problems, abdominal or chest pain, breathing problems (*Landale, Claxton*).

*Psyche and soma interact to lead to illness*: via the stress response, the immune system, and by trauma (maybe early attachment trauma) leaving the nervous system in a state of chronic readiness to deal with threats, including interpersonal ones - this ties in with polyvagal theory, especially for gut problems (*Porges*).

*Trauma*: childhood abuse, neglect, and having a remote and uninvolved father, are all associated with psychosomatic disorders (*O'Sullivan*). Psychosomatic illness is often triggered

by a traumatic event, e.g. bereavement (especially if tragic or guilt-ridden), serious physical or sexual assault, or by feeling trapped e.g. poor housing, marital disharmony. A tendency to somatise often begins in childhood: parental anxiety in year one is linked to recurrent abdominal pain, and parental over-attentiveness to childhood sickness is a risk factor for later unexplained illnesses.

Somatic symptoms with no clear physiological basis are common amongst traumatised children and adults (*van der Kolk*): chronic back and neck pain, fibromyalgia, digestive problems, IBS, chronic fatigue, some forms of asthma.

*The effect of culture*: psychosomatic symptoms tend to fit what seems to be a credible organic disease for the time and culture (*Kradin*). Symptoms that arise from stress or anxiety reflect what the patient understands about the body and disease (*O'Sullivan*). Society and the media plant ideas that lead to "an acceptable public manifestation of distress", e.g. in the 1990s many people thought they suffered with candida, now they are more likely to attribute their symptoms to gluten sensitivity or allergies.

*The unconscious nature of psychosomatic symptoms*: it's hard for both doctors and patients to understand this (*O'Sullivan*). People's perceptions of the severity and persistence of their own symptoms can be very inaccurate, and it is not the symptoms themselves but how we think about them that is at the heart of the disability they cause. Seeking attention and help for every medical complaint is often a feature of psychosomatic illness. Reward and gain, e.g. sympathy, loving care, financial reward, can encourage psychosomatic illness. 'Illness behaviour': medicalising every physical sensation can itself lead to illness.

Another risk factor for psychosomatic illness is being female (*O'Sullivan*).

## **stress & illness**

We get sick from activating the stress response too often, too long, and for purely psychological reasons (*Sapolsky*). Ongoing stress doesn't make us ill per se, but it does increase the risk of disease: "no single disastrous effect, no lone gunman. Instead, kicking and poking and impeding, here and there, make this a bit worse, that a bit less effective. Thus making it more likely for the roof to cave in at some point." This happens via an over-activated cardiovascular system and chronically high blood pressure, and chronically high cortisol suppressing the immune system, leaving us more prone to infection and less able to fight back once infected.

The autonomic nervous system and the HPA axis account for some but not all psychosomatic symptoms (*O'Sullivan*). Under chronic stress, the sympathetic nervous system can be activated for long periods at a low level, causing high blood pressure or heart palpitations. Bodies can react in sympathy to the mind's distress. Cortisol plays an important role in the metabolic, cardiovascular, immune and behavioural responses to stress. Normally, cortisol regulates the HPA axis: rising levels act on the hypothalamus and pituitary gland to reduce further cortisol release – a negative feedback loop that prevents an over-active response of various body systems to stress. Both the failure of the HPA axis to respond adequately to stress, and the failure of the negative feedback loop with chronic stress, are implicated in psychosomatic illness.

*Under-secretion of cortisol*: can lead to chronic fatigue syndrome, fibromyalgia, rheumatoid arthritis (*Sapolsky*). Low cortisol is associated with unresolved trauma and implies poor recovery from stress (for which we need cortisol).

## **insufficient sleep**

Stress and anxiety can mean insufficient sleep, which can contribute to all sorts of health problems: cardiovascular disease, stroke, congestive heart failure, type 2 diabetes, even Alzheimer's (*Walker*). Routinely sleeping less than 6 hours a night "demolishes your immune system", increases your risk of cancer, and is associated with depression and anxiety. Too little sleep links with hormones that make you want to eat more (weight gain), and shortens your life span.

And sleep deprivation is itself a stressor – so, a vicious circle (*Sapolsky*).

## **the immune system: psychoneuroimmunology**

Psychology + neuroscience + immunology: how mind and body interact via the immune system. Psyche affects the immune system via the stress response, and the immune system affects the brain by crossing the blood–brain barrier to ‘infect’ the mind (*Bullmore*).

*Immune suppression*: normally, cortisol activates the immune system and then suppresses it to avoid over–shooting into auto–immunity (*Sapolsky*). But severe and sustained stress may lead to the HPA axis releasing too much cortisol for too long and thereby suppressing the immune system below baseline, increasing the probability and severity of immune–related illnesses.

*Over–active immune system*: chronic emotional stress (e.g. from bereavement, social isolation, poverty, debt) can over–activate the immune system: excess cytokines and macrophages inflame the arteries, triggering heart attacks and strokes (*Bullmore*).

*Soma affecting psyche via the immune system*: cytokines fight infection by triggering fever, loss of appetite and the need to sleep more. But they can get into the brain and cause depressive symptoms including excessive or chronic fatigue (*Bullmore*).

*The immune system can be affected by childhood trauma*: ‘remembering’ it so that it responds to adulthood infections and social stress with disproportionate inflammatory responses that trigger depressive symptoms (*Bullmore*). Changes to immune cells following trauma can make the immune system over–sensitive to threat so it kicks off when not needed. The body, in concert with the brain, doesn’t feel safe.

*‘Burn–out’*: excessive macrophages leave the person prone to more extreme immune reactions to further stress (*Bullmore*). Adrenaline makes macrophages react as if the body were infected and less responsive to the soothing effects of cortisol.

## **autoimmune disorders**

The immune system is prone to making mistakes, causing illness as well as protecting against it. Lymphocytes can mistake the body’s own proteins for alien proteins and mount an immune response, manufacturing antibodies against them. “One part of the immune system thinks the body is under infectious attack by the anti–bodies produced by another part of the immune system” (*Bullmore*).

Macrophages churn out cytokines that cause inflammation, which can go on for years.

Autoimmune disorders include allergies, rheumatoid arthritis, ulcerative colitis, lupus, MS, possibly Alzheimers. Damage can be to joints, connective tissue, organs – therefore to eyes, skin, nervous system (including the brain).

Psychoneuroimmunology means that trauma may play a role, but this doesn’t necessarily mean that it causes autoimmune disorders.

## **inflammation**

What you get when the immune system tries to heal an injured part of the body: swelling, red (more blood), painful. Lymph fluid leaks out of blood vessel walls to attack alien invaders (*Bullmore*).

Inflammation has to be regulated by various neuropeptides that promote and inhibit it, so that it heals without becoming destructive. Because neuropeptides both promote and inhibit inflammation, psychological factors can be involved. Cytokines also promote and inhibit inflammation, e.g. when flu makes your body ache and you feel depressed afterwards.

Cortisol suppresses immunity by suppressing inflammation, so stress (physical or psychological) can do this (as can anti–inflammatory drugs).

Chronic stress can mean chronic inflammation in joints, connective tissue, organs. Chronic high blood pressure causes inflammation in blood vessels. Chronic inflammation can become fertile ground for serious illness to develop, e.g. heart disease, cancer.

The gut is in a permanent state of controlled inflammation so it can deal with all the alien invaders we eat. Chronic stress means the balance can tip over into inflammatory bowel disease.

*Low cortisol from early stress and trauma:* if a child isn't supported to express distress and anger effectively, high cortisol levels can flip into low cortisol levels: then his stress response doesn't suppress his inflammatory response (*Gerhardt*).

*Psyche > soma:* the brain can affect inflammation in the body and thereby contribute to physical illness.

*Soma > psyche:* the body's state of inflammation can affect how you feel and what you think about – biochemicals can cross the blood brain barrier to trigger depression (*Bullmore*).

### **psychosomatic conditions in therapy**

Ongoing stress and unresolved trauma, including early attachment trauma, may be factors underlying psychosomatic illness.

We may be tempted to interpret an illness as psychologically meaningful (*Stauffer*). The left hemisphere can be categorical and dogmatic, so the right is needed to allow a shared understanding of the psychological aspect of an illness to unfold in the therapeutic dialogue. Interpreting symptoms can be done jointly between therapist and client, rather than the therapist's expert knowledge dominating, or looking them up in a book.

Clinical experience shows that emotional expression and psychological transformation don't necessarily lead to physiological healing.

A psychosomatic disorder is a hypothesis, so address the person rather than the disorder (*Kradin*).

Reflect on what purpose the illness serves, where the gain lies, and address the trauma (*O'Sullivan*).

To avoid shaming and angry reactions, it's often better to talk to people about their stress levels than interpret illness psychologically. "You're not mad, you're suffering from stress, anxiety and trauma in ways you haven't yet realised".

### **conclusions**

Ending brain-mind dualism allows us to see that psychosomatic illness is not imaginary but reflects something real happening in the brain (*O'Sullivan*). Maybe 30% of GP consultations are for psychosomatic symptoms, so we need to believe in their reality and the power of the mind over the body.

Underlying psychosomatic conditions reflect ongoing stress and unresolved trauma contributing to:

- too much sympathetic arousal and cortisol release
- too little cortisol release
- sleep disruption
- immune system suppression
- an over-active immune system: chronic inflammation, autoimmune illnesses

Emotion and stress plays out in the body as well as the brain. We may be aware of our emotions, but we may be very unaware of our stress levels – which can include suppressed emotion that stops midway through the cycle of arousal.

The psychological element of an illness may be the straw that breaks the camel's back – and it's the aspect of the illness that therapy can address. We all somatise, so it makes sense that our stress and distress play out in our bodies as well as in our brains and minds. A right brain-body view would not have a problem with this.

Vice versa, soma can affect psyche:

- ongoing sympathetic arousal and cortisol release in the body changes the neural landscape
- inflammatory molecules in the blood can cross the blood-brain barrier

- protein molecules can travel up the vagus nerve from gut to brain and cause Parkinson's (this is new and weird to me, but confirmed by Steve Porges)

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